PMI

VOL. 1 NO. 1
JANUARY
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PHOTO METHODS FOR INDUSTRY

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A copy of the fully illustrated SP brochure is available at your Nikon-franchised dealer, or by writing to Nikon Incorporated, Department PM-1, 251 Fourth Avenue, New York 10, New York. *In Canada:* Anglophoto, Limited, 880 Champagneur Avenue, Montreal.

Get more information. Circle 448, page 59

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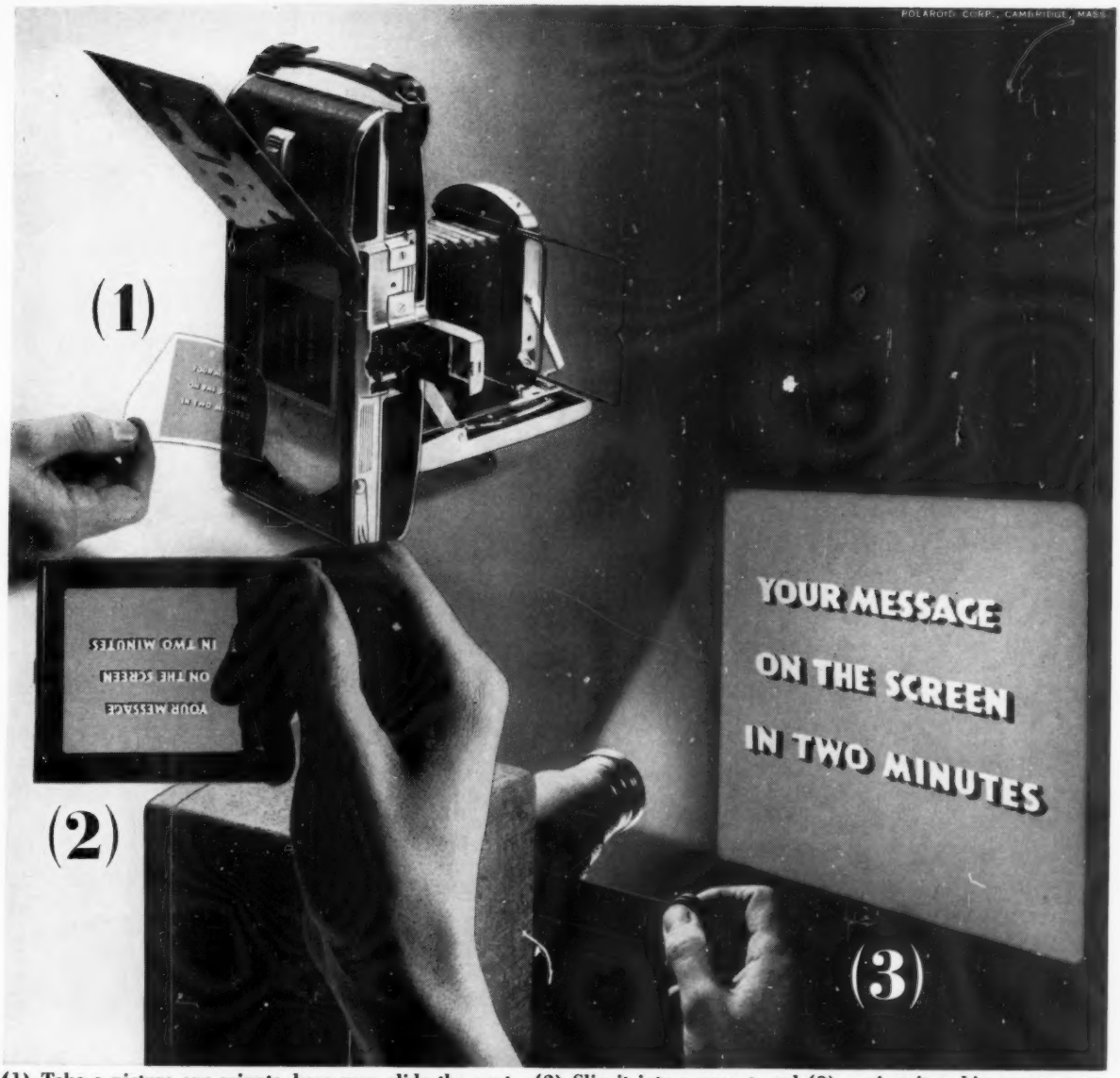

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JANUARY, 1958

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FEATURES

23 EDITORIAL
Your magazine—What's in it for you

24 FROM TWILIGHT TO DAWN ***Arnold Eagle***
The exciting industrial world at night and how to capitalize on it photographically

28 READERS' SHOWCASE
2 pages of excellent industrial photographs from readers

30 PHOTO DEPARTMENT ANALYSIS NO. 1
Esso Research Photo Unit—a complete report

36 IN-PLANT TEST
Western Electric photographer tests the new Hasselblad 500C

37 QUESTION & ANSWER ***Bernard Hoffman***
PMI's forum of industrial photo technique

38 ALCOA'S GREAT NEW MOVIE ***Les Barry***
Ingenious cinematography makes an exciting industrial film

41 SUPER SLIDES: IDEAL COMPROMISE?
A complete report on the newest slide format

42 PORTFOLIO
Two Eli Lilly photographers focus on industrial photo-journalism

48 RECIPROCITY FAILURE ***Lloyd E. Varden***
A long misunderstood photographic hobgoblin—what it is and what to do about it

DEPARTMENTS

6 F.Y.I
For your information—the people behind PMI

8 INDUSTRIAL COLOR
Samuel Lang & Leonard Zoref
First of two articles on new positive-negative color

10 PHOTO METHODS IN USE
Using a Speed Graphic to study lightning's secrets

12 METHODS FOR TOMORROW
Lloyd E. Varden
A glimpse into the future of graphic arts

16 INDUSTRIAL MOTION PICTURES
Arnold Eagle
Where to begin in the fast-growing industrial movie field

20 GRAPHIC ARTS
Herbert P. Paschel
The surprising electronic reproduction devices

54 NEW PRODUCTS
What's new on the market for the photographer in industry

58 FREE LITERATURE
Booklets, folders and data—yours for the asking

62 ELECTRONIC FLASH
Edward R. Farber
The electronic flash and its many applications in industry

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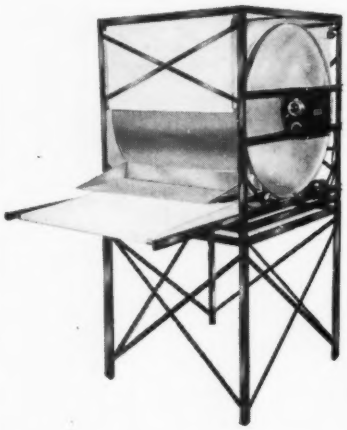

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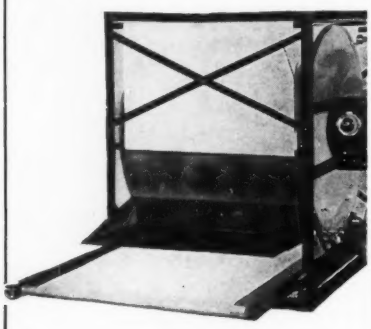

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F.Y.I.

F.Y.I., besides rhyming with PMI, is meant to give you the facts which cross our desk just before press time—for your information. It also provides us with space for anecdotes and info that don't seem to fit anywhere else.

To start, it may interest you to know of a couple of recent salutes to the industrial photographer. One —you should pardon the expression —is money. You have a chance of winning $500 as top prize in the industrial division of the 11th Annual Graflex Photo Contest; you get another $500 if your entry takes top prize for all the classes. Deadline for entries is March 1 . . . The other tribute is a 3-pager in the December 6 issue of *Printers' Ink* which tells how bigger and better industrial pictures pay off in readership.

A man who knows the value of "bigger and better industrial pictures" is **Arnold Eagle** (he's been taking them for a quarter century). Eagle is PMI's executive editor and will be sharing his photographic experience with you regularly on these pages. Eagle's credits include three Venice Film Festival awards for outstanding cinematography, still pictures for the leading industries and magazines of the United States and thousands of cigars for which H. Upmann debits him. His offering this month, "From Twilight to Dawn," deals with night photography . . . **Samuel Lang** and **Leonard Zoref** cooperate on their review of the color negative and its new importance to the industrial photographer. Their column, "Industrial Color," will appear monthly. They have spent most of their adult lives in perfection of color technique. . . . **Edward R. Farber,** who begins his electronic flash column in this issue of PMI, is an old hand at the game. He began experimenting with electronic flash in 1939 while a staff photographer on the Milwaukee (Wis.) *Journal*. By 1940 his newly-formed company, Strobo Research, was turning out units for the *Journal* and soon for just about everyone else. He is president now of Roloc Incorporated, an outfit he organized to make specialized electronic flash units. His column is strictly F.Y.I.

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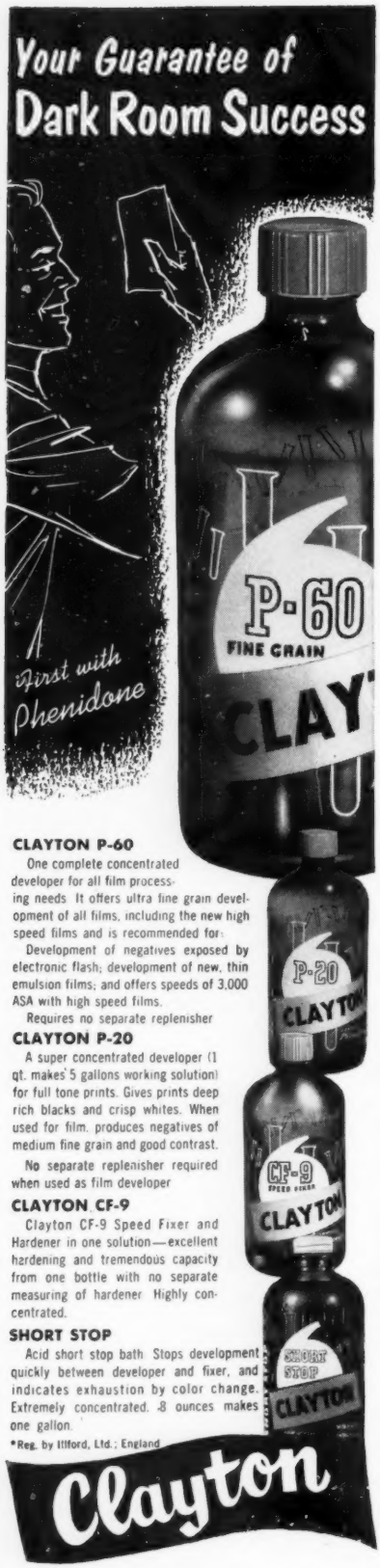

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by Samuel Lang & Leonard Zoref

INDUSTRIAL COLOR

New Kodacolor, which has made negative-positive color an animating topic of conversation among the color photographers we know, is a different breed of cat from the original, intended mainly for amateurs. When the first of the new type, CU Kodacolor, was introduced two years ago—it surprised more than one color expert with the quality of the prints it yielded.

Professionals who were impressed with the results of the film's self-masking dye couplers were quick to exploit Kodacolor's new versatility: from it they made positive color transparencies, Type C prints, Dye Transfer prints, and black-and-white prints worthy of photomechanical reproduction. In the wind are materials for making improved Dye Transfer prints and methods for making engravings directly from the Kodacolor negative.

Kodak negative-positive color has been a professional's baby for only two years, but it has grown fast. In our estimation, it will be the biggest member of the color family in many industrial, commercial, and scientific applications.

We've watched its infancy, and we offer this and next month's column as a progress report to the professional photographer.

Four films

At present, there are four negative films for still photography: Kodacolor, Ektacolor Type S, Ektacolor Type B, and Ektacolor Type SO 1185. *Kodacolor* was the first of the improved emulsions; it's marketed in 828 to 116-616 roll film sizes. For all practical purposes, *Ektacolor Type S* is the sheet film version of Kodacolor. *Ektacolor Type B* is *not* one of the improved films; it's useful for the long exposures in which the improved films fall down. *Ektacolor Type SO 1185* is a 35mm film and is the newest of the line. It's available in 100-foot bulk rolls. Our preliminary tests indicate that it's similar to Kodacolor, Ektacolor Type S.

Ektacolor Type SO 1185 should not be confused with reloaded scrap ends of Eastman color negative stock. Eastman color is intended for motion pictures and filmstrips. It is much slower and grainier than Ektacolor Type SO 1185. We do not recommend Eastman motion picture color films for still photography.

Better fast than slow

One recognized flaw of the improved, negative color films for still photography is their loss of color balance when exposed slower than 1/25 sec. At slow speeds, each of the three layers changes in sensitivity. Since this affects three contrasts as well as three densities, there's no hope of rescuing the color distortion in the darkroom. Exceptions to the rule are photographs in which only one color predominates or when color balance is unimportant. Thus we have seen successful color negatives made at ⅕ or even 1 sec. But for the vast majority of subjects taken when slow exposures are necessary, we go along with Kodak and advise you revert to Ektachrome Type B until a slow-exposure self-masking film is available. Type B won't give you the rich color that makes Type S so popular, but it will keep color balance.

An even better solution is furnishing enough light so that the slow exposure is unnecessary. For example, the usual procedure for many plant photographers out to make a picture of a piece of equipment is to set up flood lighting. They forget that with Kodacolor or Ektacolor Type S, even the tiniest portable strobe can give plenty of light for even a huge assembly line—if it's

(continued on page 11)

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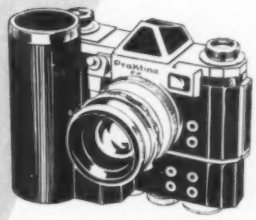

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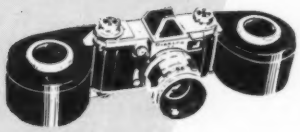

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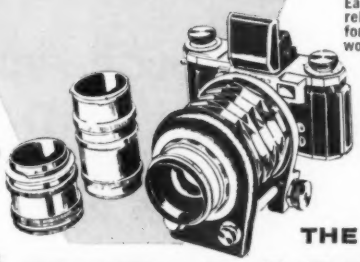

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PHOTO METHODS IN USE

Photographs confirm answer to . . .

LIGHTNING PUZZLE

Engineers from the Ohio Brass Co., Mansfield, Ohio, puzzled at the fact that lightning sometimes would—sometimes would not—flash over the insulators they designed for steel towers bearing high-voltage power lines. Since events occurred too fast for observation, even when simulated in a lab, engineers confirmed their hypothesis that the height of the tower was responsible for the erratic and destructive behaviour of the lightning charges—with time exposures made by the illumination of artificial lightning with a Speed Graphic. THE END

Why YOU Were Selected to Receive The First Issue of PMI . . .

Long before the first copy of this magazine was brought to life, a lot of thought was given to the person meant to read it. For over two years we questioned photographers working for Industry, Science, Business and Government. There were hundreds of calls . . . interviews . . . surveys. We pried into problems, delved into darkrooms seeking the key to the one question a good editor never stops asking: "What do they want to know?"

As publishers of Modern Photography, Photo Dealer, Directory of the Photographic Industry, Phillips Catalogs and Amphoto Books, we have long been in close touch with the remarkable advances recently made in the field of industrial photography. PMI—staffed by experts in industrial photography—will concentrate on publicizing, interpreting and analyzing the field's continuing rapid advances. One thing is certain: We have an excellent idea as to the type of information photographers of YOUR high standards are looking for. This first issue of PMI is just a cross-section of what we will bring you during the coming year. Already in preparation are a host of more exciting articles and reports you will want to read.

So you see, YOU were chosen to receive PMI because you are the man for whom it was conceived. We hope that you will find its pages interesting and valuable —and we will welcome your comments.

Cordially,

Everett Gellert

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Page 59

INDUSTRIAL COLOR

(continued from page 8)

flashed repetitively. Of course this technique precludes taking a scene with natural motion or a high level of existing light in it, but every technique has its limitations. We know of photographers who have fired their strobes 30 times and more in order to get enough light on the subject for one exposure. Flash, too, gives high-intensity, short-duration light. Some of the best negatives we've seen were shot with clear flash on Ektacolor Type S.

The exposure latitudes for these improved negative films are remarkable for color—about two stops on the overexposure side and ¾ to one stop on the underexposure side. The same rule of thumb as the one for black-and-white photography holds: If in doubt, overexpose. An overexposed negative usually makes a better print than a too thin one. (Exposure index for Kodacolor and Ektacolor Type S is 32 daylight and 25 tungsten. Ektacolor Type B has an E.I. of 8.) We think it's so important, we'll say it again: If you have any doubt about exposure, bracket a few shots on the over side.

By the way, you can judge a color negative visually just as you would an ordinary black-and-white one if you view the color negative through a green (No. 59 or 61) filter. But all the colors are reversed to their complements and there are colored coupler masks as well, so it's hard to judge negative color balance.

Unlike reversal color films, however, you can rarely miss with color balance. Instead of matching your light to the film while shooting, all the balancing is accomplished with filters in the enlarger. In general, there's no need for color correction or conversion filters.

Contrary to the manufacturer's recommendation to correct light to 3800 degrees Kelvin, we find that shots made without any filters at all render better negatives for printing.

For one thing, the absence of filters on the camera makes available the full speed built into the film and tends to decrease the chance of undesirably thin negatives.

Secondly, we believe this recommendation is based more on theoretical than practical considerations. Kodacolor and Ektacolor Type S are theoretically balanced for scenes illuminated with 3800K sources. (3800K is the color temperature of light emitted by clear flashbulbs.) The idea is to standardize illumination, film, and processing—so that the color printer can use one filter bal-

(continued on page 65)

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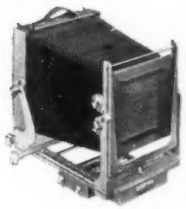

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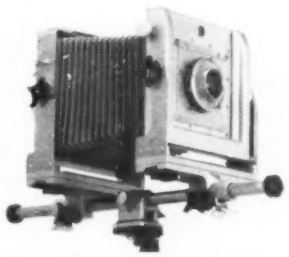

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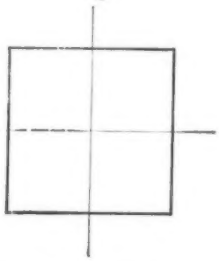

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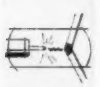

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by LLOYD E. VARDEN

PHOTO METHODS FOR TOMORROW

The windy city of Chicago was recently the scene of an unusual event. From December 6 to 10 the Society of Reproduction Engineers sponsored the first Visual Communications Congress at the Hotel Sherman. The panel discussions, lectures and equipment exhibits were centered mostly about photo-copy methods and other means for reproducing printed documents, engineering drawings, etc.

You might ask, "What's so unusual about that?" Well, according to my rough count at some of the sessions, over 1000 people were in attendance and about 50 manufacturers had exhibits. If such a congress had been held ten or 15 years ago the sponsors would have been lucky to get a turnout of more than 100 people, no more than ten exhibitors.

Manufacturers & associations

Despite the inroads made by several of the newer photo-copying processes, the old standbys, blue printing and diazo printing, are far from dead. On the contrary, they have expanded considerably. For example, there are twice as many manufacturers of diazo printing materials today as there were only a few years ago, and these fields are strongly represented by the International Association of Blue Print and Allied Industries, publishers of *The International Blue Printer*, and the National Blue Print and Diazo Coaters Association. Even the recently organized Society of Reproduction Engineers and its journal *Reproduction Engineer* are concerned to a large extent with blue printing and diazo printing. But I shall not dwell upon developments in these fields because it is assumed that readers of PMI are mostly interested in the silver halide processes.

A new organization representing the manufacturers of silver-sensitized materials has been formed, called The Association of Photo Sensitizers. Six manufacturers are so far in this group, and I think it is appropriate to set forth their aims:

1. To promote a better understanding of the uses of photo-sensitized materials, and their many and varied industrial applications.
2. To collect and disseminate information of value to the manufacturers, distributors and consumers of photographic products.
3. To promote the standardization of photographic products and the testing thereof.
4. To promote the growth and expansion of American sources of raw materials used in the photographic industry.

This newly created organization has no intention of functioning in competition with the National Association of Photographic Manufacturers. Rather, it plans to support and encourage the NAPM as the over-all industry organization.

The APS has already performed one valuable project in keeping with its second aim. In July, 1957 a booklet was issued, entitled *Index of Photographic Materials for the Reproduction Field* which is available to all industrial photo-consumers, free-of-charge. You can obtain a copy by writing to The Association of Photo Sensitizers, Inc., Room 1617, 51 East 57th St., New York 22, N. Y. Incidentally, in the back pages of this booklet is a handy reference list of all manufacturers of silver-sensitized reproduction materials in the U. S. A., giving the complete name and address of each company, whether a member of APS or not.

I shall not review the contents of the APS *Index* other than to mention that the products given in it are grouped under five basic classifications namely:

I—Papers
II—Films (acetate etc.)
III—Films (relatively stable polymers)

(continued on page 14)

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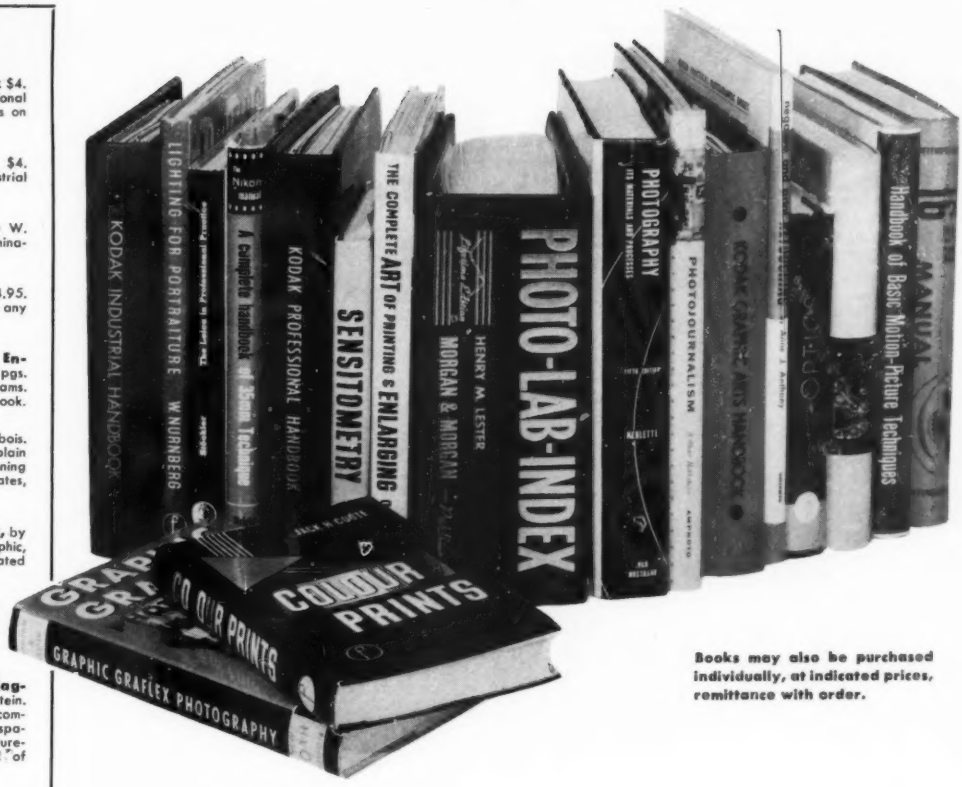

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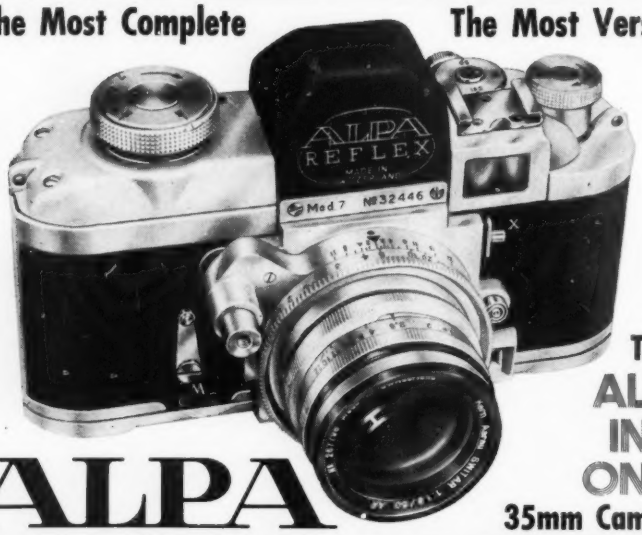

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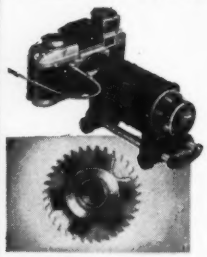

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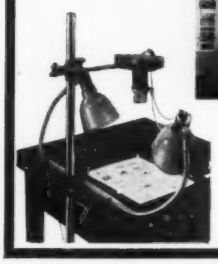

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METHODS FOR TOMORROW

(continued from page 12)

IV—Cloths (linen and glass)
V—Miscellaneous

Each of these is subdivided according to speed and emulsion type:

A—Room Light (very slow)
B—Contact (slow)
C—Projection (medium)
D—Projection (fast)
E—Projection (litho)

The non-silver processes

Despite the natural inclination of photographers to place emphasis on silver halide processes of copying and reproduction, the non-silver systems must be considered if a proper evaluation is to be made of how to best handle particular classes of work. The blue print and diazo systems have been around long enough so that we can judge pretty accurately where they are best applied. But the newer systems of reproduction require separate consideration, and have to be re-evaluated from time to time because improvements are often made rapidly once a process gets underway.

There has been a certain trend away from silver halide processes, but this does not mean that the silver processes are being replaced by other systems. In some instances this may well prove to be the case, but overall, the newer processes supplant, rather than replace, silver methods. I am in agreement with a statement credited to the A. B. Dick Company, published in the November, 1957 issue of *Reproduction Engineer*, as follows: "Why argue about processes? Each of the duplicating processes has valuable features. Each has its place in business today. You get the real benefits and savings of modern reproduction methods when you have the process or combination of processes that fits your individual needs."

New processes often fill a need that previous methods failed to do.

And several processes introduced competitively to meet a specific need can flourish independently, because each will have particular features to attract particular consumers. For example, the Thermo-Fax copying process of the 3-M Company, the Verifax Process of Kodak, and the diffusion transfer process made by a number of different manufacturers have filled the need for a convenient office copying method, and each has proved to be commercially successful. The final copy images in the Thermo-Fax and Verifax systems are non-silver, al-

(continued on page 61)

Something is missing

If pigs had wings they would fly . . . and if this pile of baseball equipment had a man in it, it could play baseball.

Similarly many well equipped photographic operations have something missing . . . and that something often makes the difference in both the quantity and quality of their output.

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by Arnold Eagle

INDUSTRIAL MOTION PICTURES

According to one estimate, American industry spends $100,000,000 on motion picture production and release prints annually, with the figures climbing every year. Which means that 1) industry thinks that films are worth spending money on, and 2) if you're not involved now, industrial cinematography may soon be part of your job. This column and some of those to follow are addressed to the competent still photographer who anticipates his job's branching into movie-making.

If you're a beginner, it may reassure you to know that any experienced still photographer can learn to operate even the most complicated B. & C. Mitchell motion picture camera in an afternoon. And your still photographic experience with exposure, lenses, the photographic processes, color, is almost directly transferable to the motion picture medium. If you are well versed in the magazine type of picture story, you will have a head start on the problem of screen continuity. As you can well imagine, there are some pitfalls. I hope I can steer you past them in these columns.

Let's start at the beginning. From a production point of view, industrial films can be classified as:

1. the silent film with titles
2. the film shot without sound but with narration added after the film is edited
3. the sync-sound or lip-sync film wherein the speaking voice is recorded simultaneously with the image.

In recent years, producers who handle industrial films have seldom made *silent films*. But the silent film has a definite place in industry. It is the cheapest and simplest way to make films. The equipment needed is comparatively simple and the production is quick. The silent film is far more capable of putting an idea across than still pictures or slides, yet not much more expensive. This type of film is an ideal tool for the salesman who must demonstrate a product or method. He can speak during the film and adjust his talk to his listeners. In contrast, a "canned" narration on the film might insult the intelligence of an expert listener or baffle a listener new to the subject. The silent film is likewise adaptable for engineering studies, for employee training and for functional records of motion of any sort. If it is a 16mm film shot at the "sound" speed of 24 frames per second—rather than the "silent" speed of 16 frames per second—sound can be added later with an optical sound track or with a magnetic stripe applied to the edge of the film. Further, the 24 frames per second speed reduces the chance of undesirable "flicker" on the screen.

A silent film does have its limitations. If it lasts more than ten minutes it is likely to become tedious even to the most patient audience. The number of ideas it can convey is thereby restricted—usually to one. But it is an ideal starting point for the beginner in motion pictures.

The *narration type film* in which the sound is "dubbed" in after the film is edited, is the most widely-used method in industrial films. It seems as if it were a silent film with sound added but it's usually much more complicated. It often runs longer. It is seldom a one-man production. Often needs expert outside help. A script for it should be prepared in advance. It is more costly. It necessitates greater production problems because it involves complicated editing technique, sound recording and the preparation of "A" and "B" rolls for printing. There's not space here, but later columns will go deeper into this.

The *sync-sound film* is the most difficult and expensive to produce. This type of motion picture is rarely successful without the aid of a group of professionals with specialized skills including a scriptwriter, a director, actors, a sound man, and an editor. Knowing how to deal with these experts will be important if you do go deeply into the field.

(continued on page 18)

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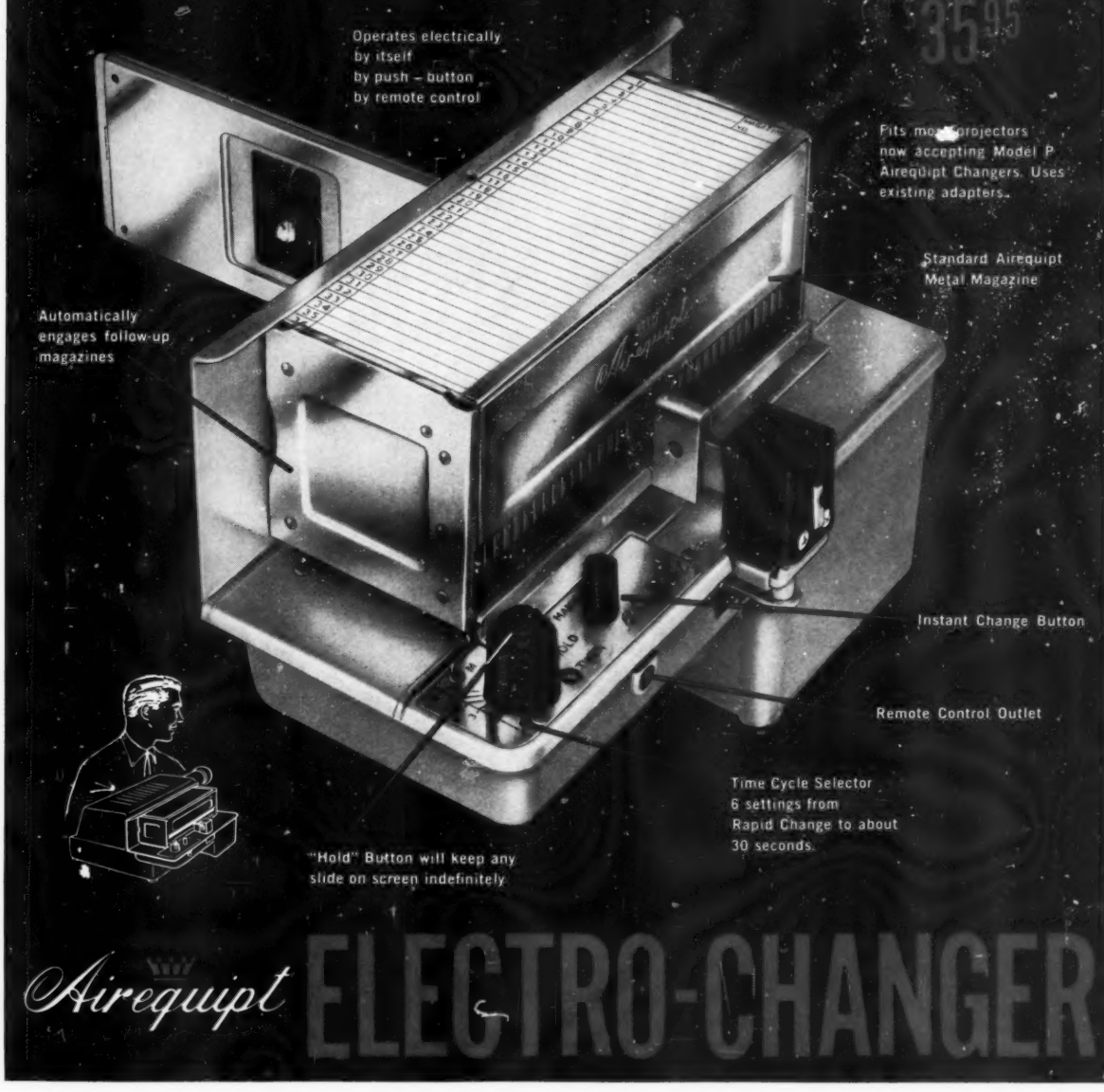

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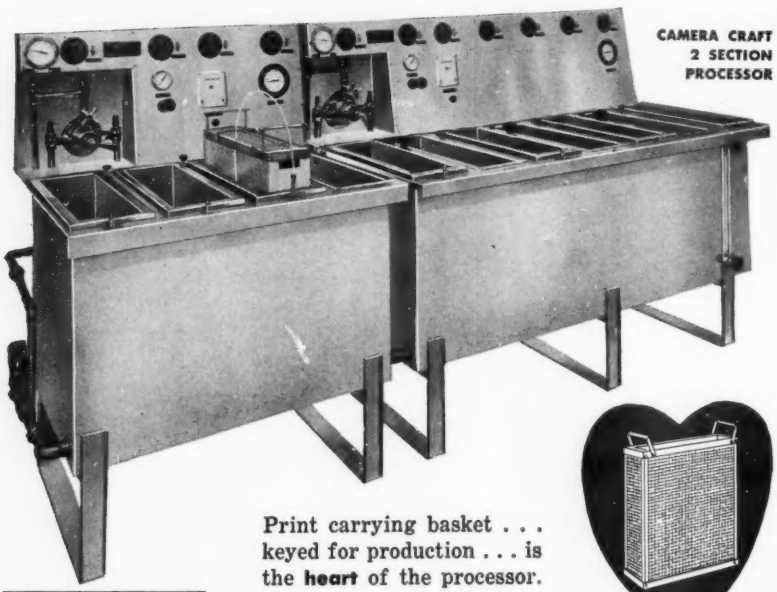

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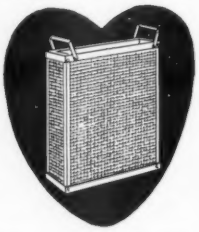

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An ideal folding dolly — easily installed on tripod . . . all three ball casters roll freely or lock securely by one control.

Get more information. Circle 421, page 59

MOTION PICTURES

(continued from page 16)

Many firms are turning to films made by their own staffs. One reason is to avoid the heavy costs of commercially-produced films, usually $1,000 to $5,000 per minute of showing time. Management feels it can produce its own films much cheaper. Further, it can sometimes absorb the costs of a staff-made film under ordinary administrative expenses, without appropriating a special budget for each film. Members of management often feel that their own employees have a better understanding of their own company than an outsider. Other important factors are production secrecy and government security regulations, problems sidestepped by utilizing company personnel. And then, too, management sometimes assumes that film making is basically a photographic process and that the still photography department should be able to handle it.

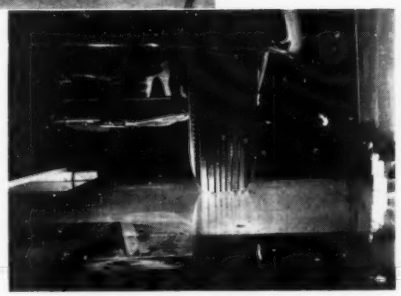
This last attitude, while flattering to you as a still photographer, is a potential booby trap. The excellence of your work probably creates the feeling that there is nothing beyond your capabilities photographically—and management inexperienced with the field has no way of knowing the special problems of motion-picture production. The catch is that management is likely to apply the most exacting commercial standards to your work. If you are charged with producing an important sales film, for example, and competition has a similar film produced by an experienced motion picture studio, your work will be judged by theirs regardless of how little help you receive or how small your budget.

Furthermore, just as it is possible to spoil a single negative in any one of dozens of ways, it is possible to ruin an entire film on which thousands of dollars have been spent. Many beginners, for example, ruin their original film by projecting and editing it. Experienced film makers handle an original literally with cotton gloves. Even if just one final print is desired, they usually make a "work print" for viewing, cutting and editing—never touching the original until the film has been edited and the sound track matched to it. Scratches acquired during editing, and wear and dirt in a projector, can render a film practically useless.

Next month I'll discuss motion picture cameras for industrial and business films—what they do, how to select and buy or rent them. THE END

Water is splashed on one-inch thick glass plate to simulate wet road conditions. Camera and lighting are in pit beneath glass. Then . . .

Car equipped with Life-Saver tire is driven onto wet glass at 20 mph.

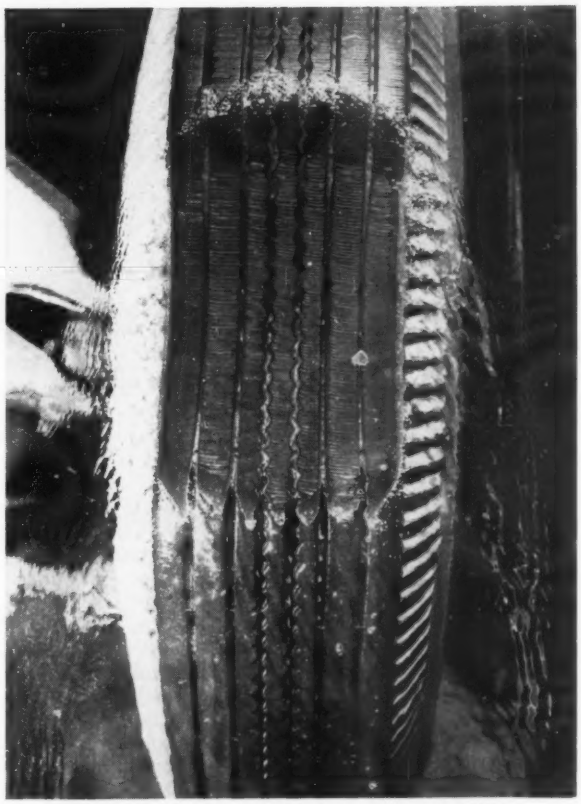


Brake is applied to stop car and show tire action. As car reaches camera field of view, photo-electric cell trips lights and shutter.

SPEED GRAPHIC®

Captures Tire Skid Action For

B.F.Goodrich



Camera catches the action of tire tread wiping wet surface dry as car comes to emergency stop.

The photo on the right is a stopped-action shot of a B. F. Goodrich Life-Saver tubeless tire coming to a sudden stop on a wet road. It is one of many remarkable Speed Graphic photographs which have been made by Robert L. Coon of the B. F. Goodrich photographic department. This use of photography in industry is unusual and interesting.

Mr. Coon's assignment was to make a dramatic picture of the tire as it wipes a wet road dry when the automobile's brakes are applied. Because the Life-Saver tire has 10,000 small cross-cuts in its tread which grip the road like tiny fingers while wiping the road dry, the picture had to show the road being wiped dry and how the fingers performed this action. How it was done is shown and explained in the pictures and captions herewith.

Pictures were taken with a 4 x 5 Speed Graphic camera, using a 5¼ lens, mounted on a tripod in a pit covered with a one-inch thick piece of special glass. Illumination was by electronic flash tripped by a photo electric cell as the car was driven onto the glass plate. This photo was used extensively in B. F. Goodrich publicity and advertising.

There's practically no limit to the photographic possibilities of Speed Graphic cameras in industry. If you'd like to know how these cameras can serve you, write Dept. PI-18 for your copy of "Industry Cuts Costs with In-Plant Photography."

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Get more information. Circle 429, page 59

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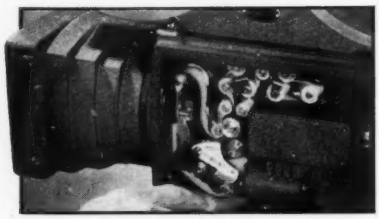

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MANUFACTURERS OF SOUND-ON-FILM RECORDING EQUIPMENT SINCE 1931

Get more information. Circle 409, page 59

by Herbert P. Paschel

GRAPHIC ARTS

Electronic devices which were to replace the time-honored reproduction methods in the graphic arts have been hinted at and even blatantly announced in volumes of publicity during the past twenty years. Obviously, the predicted industrial revolution did not materialize. But despite a seeming lack of progress, the extent to which electronic devices have actually invaded the graphic arts will come to many as a sudden and startling surprise.

Image duplication by electronic or electro-mechanical means is not new. Two devices invented during the early 1800's incorporated most of the principles used today in electronic reproduction. Alexander Bain devised the first "facsimile" machine: a transmitter and receiver by means of which a direct-reading message could be duplicated at a remote station over wire. A telegraph message was first set in metal type. A stylus ran across the type, sending current when it touched the raised faces of the characters. A similar stylus at the other end of the telegraph circuit moved across a sheet of paper but made contact only when a surge of current came through the wire. Bain's recording paper darkened under pressure. The result was a somewhat smudged but readable image of the message. This was the first application of the principle of oscillating, parallel line "scanning." A few years later, Frederick Blakewell perfected a similar device, using rotary (lathe-type) scanning.

Although the work of Bain and Blakewell forecast wire and radio transmission of messages and pictures, and the electronic reproduction devices, it was not until the discovery of the photosensitive selenium cell that the transmission of pictures became a reality. The invention of the vacuum tube—and the electronic circuits thus made possible—provided the sensitivity, amplification and flexibility to perfect the ultimate system. The more recent development of all-electronic scanning, in which the copy and recording medium remain stationary, is based on the application of the cathode ray tube and television principles.

Like Bain's device, present-day machines for electronic reproduction translate an original image into electric impulses and then convert the electricity back into a graphic image. Typically, the modern devices use a tiny beam of light or a small stroboscopic "flying spot" shining on or through the original. Bit by bit this light systematically covers the entire image. As the beam is doing this, a photoelectric cell "reads" the amount of light reflected from or transmitted through the original. Then an electronic system amplifies the current from the phototube, modulates it, amplifies it some more or inverts it and finally activates a light or a stylus—like Bain's "receiving" stylus—which cuts, burns or exposes a reproduction.

Besides the widespread use of these devices for the transmission of news photographs and messages as Wirephoto, Telephoto, Cablephoto, Telefax, etc.—they have been adapted for duplicating, for making negatives for all the graphic arts processes, and for making offset and printing plates. I'll review some of the more widely known products.

STENAFAX
Times Facsimile Corp.

The *Stenafax* is a lathe-type scanner. The original is wrapped around one of the two cylinders which turn like a piece of pipe on a lathe. The scanning head, with its light and its photoelectric eye, moves slowly with the same horizontal motion as a lathe tool, covering the entire original in a spiral path. Depending on whether you want a simple duplicate of the original, a mimeograph stencil or an offset plate—you wrap one

(continued on page 64)

How RED is a signal?

Today there is tremendous versatility in color photography.

A brakeman's signal light can be as red as you want it . . . rendered, what's more, as a brilliant transparency or a print of reproduction quality.

Color sheet films come in a variety of emulsions—negative and positive. And they offer the sort of control that has, until recently, been possible only with black-and-white.

Negative color, in particular, has an enormous potential. With view and press cameras, the beginning is Kodak Ektacolor Film, Type S (short exposure, for flash and daylight) or Type B (for use with 3200 K lamps). Then, from a single color negative with the added control of filters, you . . .

- make color prints of reproduction quality on Kodak Color Print Material, Type C.
- make color prints *in quantity*, economically, again using Type C.
- make transparencies, *small* for projection, or BIG for illuminated displays, on Kodak Ektacolor Print Film.
- make black-and-white enlargements just as you would from a black-and-white negative, on Kodabromide Paper or Kodak Polycontrast Paper.

For positive transparencies, there's Kodak Ektachrome Film in sheets from 2½ x 3¼ to 11 x 14 inches, Type B or daylight.

Use it for illustrations, for displays, for projection. Ektachrome has the brilliance and speed you need for professional work.

See your Kodak dealer.

Roll-film color is discussed on the back cover of this issue.

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Get more information. Circle 422, page 39

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Versatile, lightweight portables. Wide choice of power supplies and accessories. Light equivalent to #5 flashbulb.
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For repetitive flash work, where multiple images are to be recorded. Synchronized for motion picture instrumentation work.

It's no wonder that more and more industrial, scientific and commercial photographers have learned to depend on Ascor for their lighting needs. They know that all ascorlights are ingeniously designed and superbly constructed to provide outstanding results everytime. And that's not all . . . they've learned that Ascor's exclusive "building-block" design permits adding and interchanging power supplies, light units and accessories to meet future requirements as they arise, without making existing equipment obsolete. So make the right move now . . . let your authorized Ascor dealer help you select the *right* Ascorlight for *you*.

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Ascorlights are sold only by authorized Ascor dealers. Look for this sign of service and satisfaction . . .

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AMERICAN SPEEDLIGHT CORPORATION 63-01 Metropolitan Ave., Middle Village 79, N. Y.

Get more information. Circle 405, page 59

AN EDITORIAL

IT'S YOUR MAGAZINE

NO ONE HAS seen the inside of a metal casting, the contortions of a truck tire racing along a road, the path of a mesotron, the stresses that cause the teeth to chip from a gear. They've not been seen, but they have been photographed; photographed so well that millions of people know exactly what they look like.

Which brings us to you—the industrial and scientific photographer, the graphic arts and reproduction man. Your cameras record what man has not eyes to see, memory to recall, time to reach, words to tell.

Is it any wonder that industry, science and commerce rely on your help?

Your role is indispensable. Manufacturing processes have been devised with the knowledge gained from your ability to dissect time and fix motion. Products are made reliable because they are inspected through the searching eye that you focus. Entire sciences depend on your aid; most of the insights added to astronomy since 1920 have been discovered in photographic negatives. More books, newspapers, records and magazines have been preserved by photography than one man or generations of his children can ever read. The industrial adman or editor who doubts the power of photography to bring life and authority to the printed page is today an anachronism. The salesman who does his work without photographic aid operates like an architect without blueprints.

It's our hope that this magazine will be an enlivening tribute to your everyday works of wonder with lenses, light and film. We look forward to covering them. We intend to pause at the industrial scenes which you grasp in a millionth of a second, to follow your explorations into the particles and planets that make up the universe. We shall be a medium of exchange for the thousands of ideas for making better pictures, enlarging their usefulness, for doing the job faster and more efficiently.

Our staff members, while bringing a variety of knowledge and experience to the magazine, have one thing in common: They all have made their living in photography. But it's your magazine. We need you—your interest, your criticism, your suggestions.

This, then, is PMI—first issue!

The Editors

FROM TWILIGHT TO DAWN

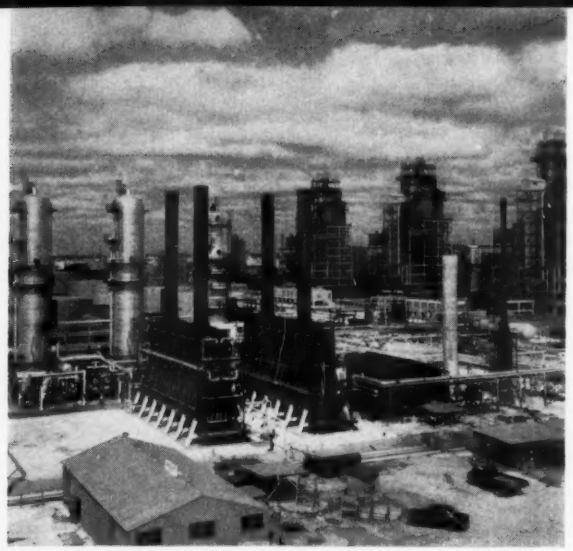
Night light will dramatize many of your assignments. Arnold Eagle explains his techniques for using existing and supplementary illumination.

Working against a printing deadline not long ago, I had an assignment to photograph a new plant for an annual report. When I arrived on the scene, it was all too clear that the plant wasn't actually finished. One wing was incomplete, landscaping had not begun, construction equipment and the builder's shacks were spoiling the view. What to do? I couldn't postpone the picture; yet by the time the report would be distributed, many of the readers would have *seen* the finished plant. The solution was a night picture which revealed solely the finished portions of the building.

Many industrial subjects not only are suitable for photography after dark, they look interesting only when taken at night. Hidden at night are extraneous, cluttering or downright ugly details. The deep blacks of the night photograph are a godsend in the hands of the creative industrial photographer. They intensify the viewer's attention to the lighted, important details. The night photograph conceals more than it reveals: it gives free play to the photographer's *and* the viewer's imagination. And because most photographs are of daytime scenes, night photographs are out of the ordinary from the beginning.

Furthermore, most industrial plants do operate day and night. There's no sense in neglecting this photographically fascinating part of industrial activity. After-hours photography is a good starting point for the unusual and compelling industrial photograph.

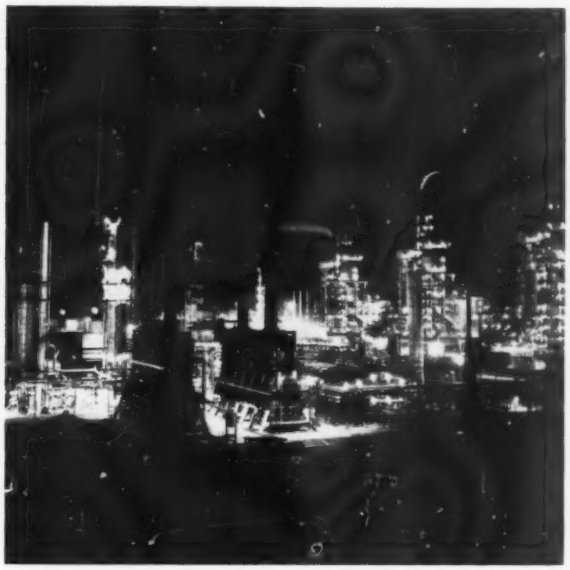
The technique of night photography is not as



DAYLIGHT APPROACH to Cities Service Co. expansion program, Lake Charles, La., seemed static and cluttered to photographer Fritz Henle. New structures merged with existing ones; foreground construction huts and autos hardly lent attractiveness and order to the scene. For solution, see photo at right.

EXISTING LIGHT from single crucible and small speedlight held aloft on boom was sufficient for Charles Rotkin's Nikon with wide-angle lens to register molten metal, ACF Industries worker, St. Louis, Mo.

RETURNING AT NIGHT, Henle made dramatic shot with Rolleiflex from same high perch as for photo, left. New furnaces in foreground are effectively silhouetted against background of brightly lighted refinery buildings. Darkness revealed hot gases coming from refinery towers and neatly framed the subject. ▼



COLOR after DARK

Correction and conversion filters for U.S. color films

	Building and street lights	Fluorescents	Sunsets	Clear flash	Amber flash	Blue flash	Photofloods	Electronic flash	3200 K lamps
Anscochrome, Daylight	None*	**	None	80C	N.R.	None	80A	81A	80A
Anscochrome, Flash Type	None*	**	85C	None	N.R.	N.R.	82A	N.R.	82C
Anscochrome, Type 532	None*	**	85	81C	None	N.R.	None	N.R.	82A
Anscochrome, Tungsten	None*	**	85B	81B	None	N.R.	81A	N.R.	None
Super Anscochrome, Daylight	None*	**	None	80C	N.R.	None	80A	81A	80A
Ektachrome, Daylight	None*	**	None	80C	N.R.	None	80B	81C	80B+82A
Ektachrome, Type B	None*	**	85B	81C	None	N.R.	81A	N.R.	None
Ektachrome, Type F	None*	**	85C	None	N.R.	N.R.	82A	N.R.	82C
Kodacolor† Ektacolor, Type S††	None*	**	85C	None	N.R.	N.R.	82A	85	82C
Ektacolor, Type B	None*	**	85B	81B	N.R.	N.R.	81A	N.R.	None
Kodachrome, Daylight	None*	**	None	80C	N.R.	None	80B	81C	80B+82A
Kodachrome, Type A	None*	**	85	81C	None	N.R.	None	N.R.	82A
Kodachrome, Type F	None*	**	85C	None	N.R.	N.R.	82A	N.R.	82C

N.R.
Not recommended

*
No filter is recommended; the result in mind is a warm rendition for pictorial effects.

**
Because fluorescents do not have a single continuous spectrum, they are difficult to use in color photography without elaborate testing for each situation.

†
Sufficient light should be supplied for ½ sec. exposure or shorter.

††
Sufficient light should be supplied for 1/25 sec. exposure or shorter.

Kodacolor which is to be sent to Kodak or a regular finisher for printing should be exposed in daylight without a filter. For printing in your own lab, a better balance can be achieved with use of the indicated filter.

IN LATE SUNSET LIGHT, Standard Oil Co.'s refinery, Baton Rouge, La., takes on unusual mood. Photographer Arnold Eagle deliberately left lens shade on 4-in. Goerz Dagor lens to cause circle that gives effect of night glow. 4x5 Linhof Technika, Panchro Press B, ½ sec., f/11. ▼

FROM THE OUTDOORS, IN. Frame indoor activity by looking in from the outside. It verifies the fact that many plants work through the night. Using synchronized flash, 4 x 5, Panchro Press B, Eagle placed two No. 22 flashbulbs in the Dayton Rubber Co. laboratory, Arkon, O. He set 135mm lens at f/22.

IN THE LIGHT OF DAWN, before sunrise, Eagle photographed Allied Chemical Caproloctan plant, Hopewell, Va. Unpainted, still under construction, spiderwebbed with scaffolding, the plant looked dismal by broad daylight. Semi-dark hid temporary undesirable details, gave plant finished look.

complicated as some photographers imagine it to be. On the contrary, any professional has the requisite skill. While conditions vary between wide extremes and specific formulas are worse than useless, a bit of experimentation will yield the professional pleasing results. I'll touch upon the principles I've gathered from practice.

Twilight: the essential 15 minutes

I find that the most effective shots of many industrial plants are taken by twilight. There is a period of fifteen minutes or so every evening directly after sunset when there is still a glow in the sky and the plant structures are silhouetted against it. I start photographing when the sky becomes dimmer than the lights of the buildings.

This is especially effective in color photography. The sky comes out a deep blue or purple, providing a fine contrast against the orange and red lights of the structures. Showing the sunset itself sometimes can make the composition even more dramatic.

Although a meter reading of the sky before it turns completely black is useful information, an exposure meter is no help in most cases. Instead I find it more practical to bracket a number of exposures of the scene to be sure of a good one.

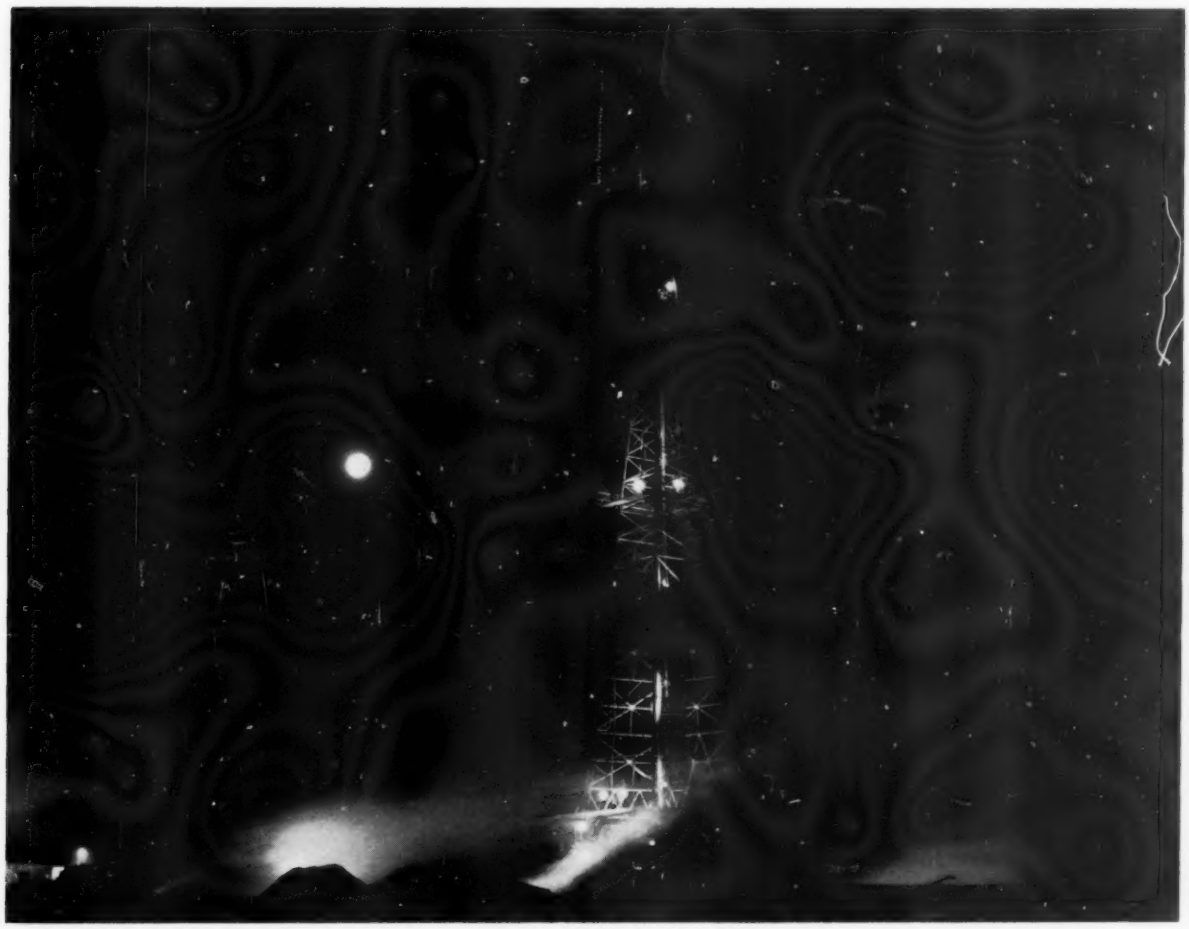
For night black-and-white shooting I find that a medium-speed film (with an exposure index of 80 to 125) is most useful. I bracket my exposures between 1/25 sec. to 5 secs. at f/11.

Choosing a color film

In color photography, I find that a daylight-type film is most effective—although tungsten color can produce interesting effects. There is noticeable difference between the color rendering of daylight Ektachrome and daylight Anscochrome sheet film when used for night photography: Anscochrome has a distinct red and purplish glow which I find very pleasing.

My Ektachrome sheet film exposures range from 1/5 sec. to 5 minutes at f/8. Anscochrome, because it is faster, can be exposed one stop less. The long exposures present a special problem, reciprocity failure—with a long exposure, one does not get twice the effective exposure by doubling the time. This problem is discussed in detail by Lloyd Varden in his article on reciprocity in this issue.

Another method for shooting at dusk is the double exposure. The camera should be mounted on a rigid tripod and the first exposure taken at sunset or when there is still a glow in the sky. I underexpose this first shot two to four stops and leave the camera in exactly the same position until there is total darkness and the regular night lights are on the subject. Then I give the film a second, normal exposure to record the lights. The result is a better balance of sky and ground exposure. The method has a shortcoming since only one shot can be made unless the *(continued on page 66)*



A LITTLE MOONLIGHT NEVER HURT in any situation! Assigned by Standard Oil Co. to shoot derrick pictures in Tomball, Tex., Esther Bubley took advantage of large black sky area and misty full moon to give a lift and more feeling to otherwise straight night oilfield scene. Using a 3¼ x 4¼ Speed Graphic and Eastman Kodak Super-XX film pack, Miss Bubley had to give a long (15-second) exposure with 5-in. Zeiss Tessar lens set at f/9.

PMI's Monthly

READERS' SHOWCASE

You are invited to send in your pictures for this feature. See details below.

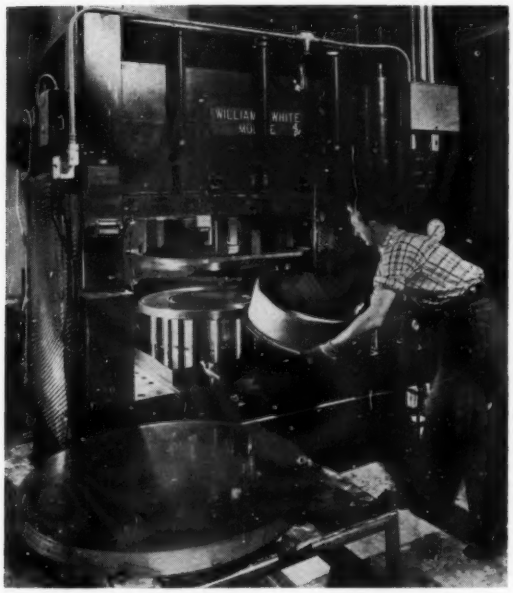
Good pictures are where you find them. The photographer in industry, government and science finds them with ingenuity, patience and usually plain hard work in his daily routine. Sad to say, fine pictures are often routinely expected of him, and his work is like a good mother's—seldom appreciated but sorely missed.

Two pages of PMI will be dedicated each month to remedying this situation. On them we will print a selection of showcase pictures from our readers, such as the selection you see here from our pre-publication assemblage of photographs.

You, as a reader, are cordially invited to send in your pictures. There are two rewards for each of the ones chosen. The first is knowing that your picture will be seen by appreciative fellow professionals. The second is $10.00. Please include your name and your company's name, a note about the picture and how it was used, and the technical data. Send them to SHOWCASE, PMI, 33 W. 60, New York 23, N. Y.

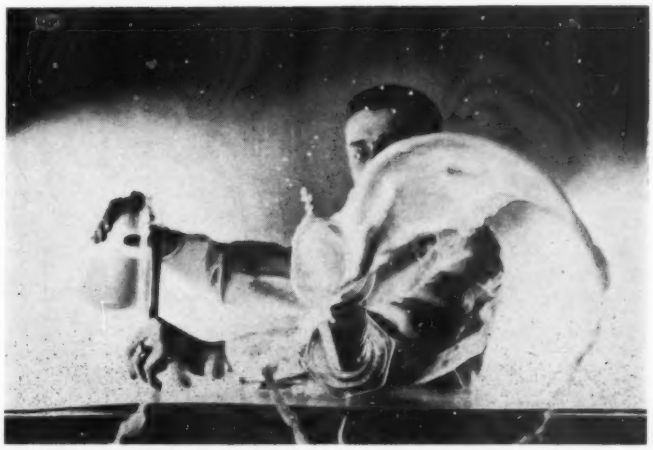
FRANK B. ELAM, Armco Steel Corp., Ashland, Ky., waited for a clearing in the smoke, then shot at 1/25 sec. so flying sparks left their tracks on his film in this shot of workers repairing a blast furnace. 4 x 5 Pacemaker Graphic, 135mm Optar lens at f/11, Royal Pan.

M. HANS ZIELKE, Milwaukee, Wis., posed a Mueller Climatrol stamping press operator at his work after setting up seven flashbulbs with Teleflash slave units. Camera was 8 x 10 Deardorff with 8½-in. Goerz Dagor lens. Open flash, f/32, Royal Pan.



LEONARD ROSS, Bethlehem Steel Company, Bethlehem, Pa., photographed one of his company's First Helpers by the hot, blinding glare of molten steel shining through the furnace door peep hole. Ross made his exposure with a Canon V equipped with a wide-angle 35mm Schneider Xenogon lens, using Eastman Kodak Tri-X film. Developer was D-76.

BERNIE CLEFF, Philadelphia, Pa., had the Plymouth in the photograph take its own picture. His problem was to show how the car's suspension gives a smooth ride. He arranged the rocky area to give the effect he desired and buried an impact contact switch he had made for the occasion under one of the stones. Hit by tire of moving car, stone closed switch which sent current through a flashgun and solenoid, clicking shutter. Cleff used 4 x 5 Royal Pan in his Linhof Technika.

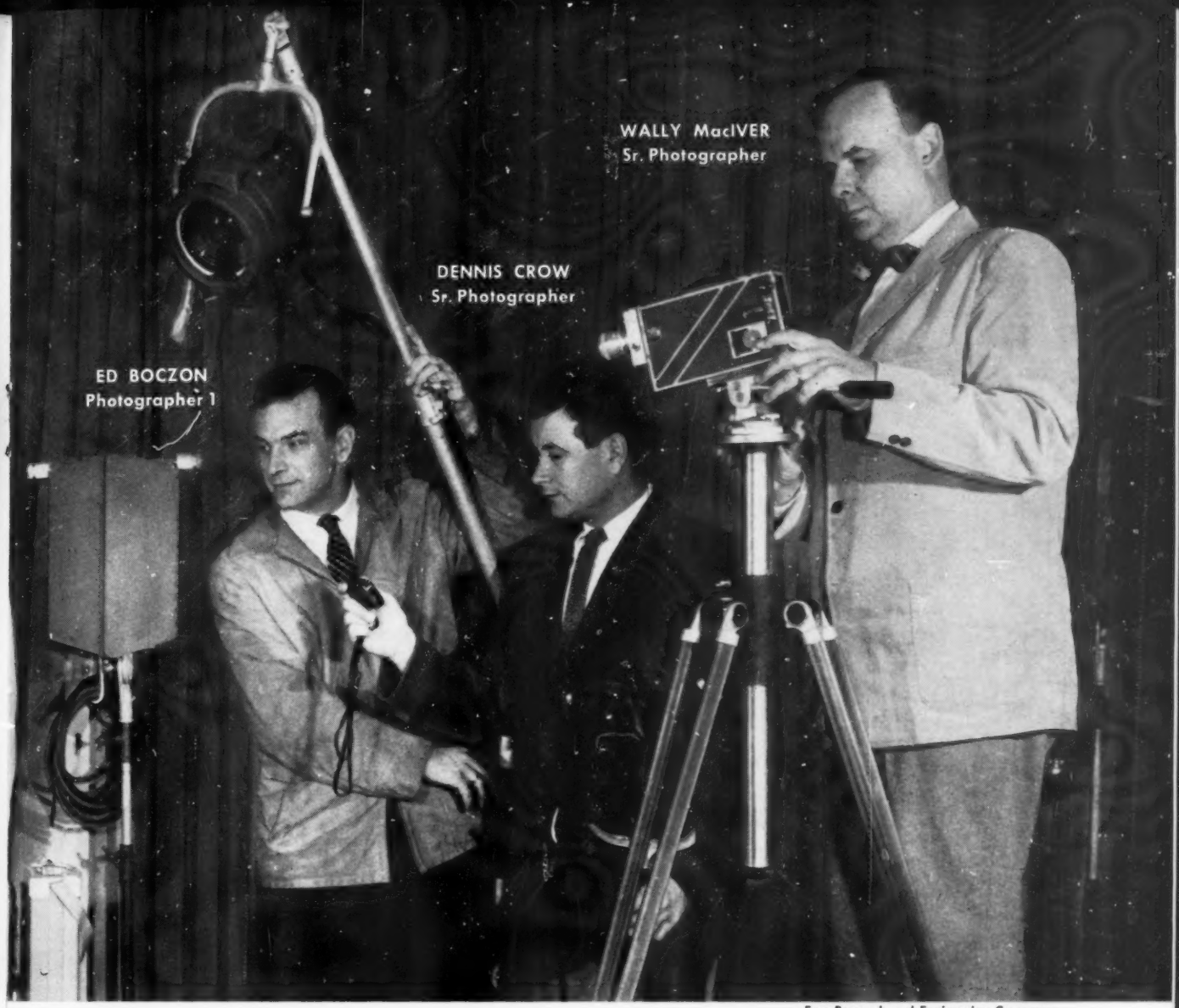


BEN ROSENBERG, Rochester, N. Y., shielded his Graphic View with a plate of glass, stretched a thin wire in front of the glass to prepare Corning Glass Works illustration. Model pushed beaker, which fell on wire setting off camera and electronic flash.

PHOTO DEPARTMENT A

Esso Research and Engineering Company's Products Research Photo Unit—How 7 people handle electron photomicrography, audio recording and high-speed motion pictures, while producing 5,000 pictures annually.

First in an exclusive PMI series on the photographic department in industry, science, government and education.



Esso Research and Engineering Company

T ANALYSIS NO. 1

The seven-man photo staff at the Esso Research and Engineering Company's research center in Linden, N. J., runs as smoothly as the lubricants it helps improve—while each photographer has a chance to exercise his own judgment and sharpen each of his photographic skills.

Using nearly every kind of tool and trick of the photographic trade, the men have no complaints about lack of variety. They shoot stills, movies and high-speed motion pictures. They make black-and-white, Dye Transfer and Type C prints. They make photographs through electron microscopes. They turn out thousands of lantern slides. When called upon, they run projection equipment, do audio recording and advise non-photographic employees on taking scientific and technical notes with the camera. Only the graphic arts are out of their photographic ken. A separate section works with reproduction.

Each man usually handles an assignment alone, starting from discussions with the originator of a photo request and ending with drying the print, mounting the slide or projecting the film.

This policy was established by photo unit supervisor, James E. Carrar, a boss who believes in hiring good men and giving them their heads. Carrar himself often does not see the photographer until a project is complete. The autonomy

PHOTO DEPARTMENT ANALYSIS *(continued)*

has a number of advantages to Carrar's way of thinking. It gives the photographer freedom and responsibility. He can take full credit for his own creations. He continually practices all his photographic skills. From the management viewpoint, the system puts the responsibility for imagination, efficiency and good technique on the photographer who was given the assignment. Naturally, Carrar inspects the results.

Each man is experienced with a variety of photographic tools and gets variety in his subject matter, too. Some examples are: The passport picture for an Esso engineer going overseas. The progress shot of a new pilot plant. The micro-photographic analysis of a glob of grease. The portrait of the company "brass." The picture of an angry black widow spider captured on company property or white rats used in medical research at nearby Rutgers University. The high-speed film of an auto tire in shock tests. The illustration or publicity assignment in the engine room of an oil tanker.

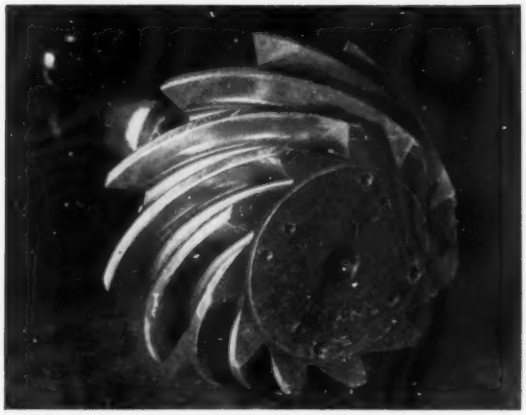
The 5,000-odd pictures the unit makes annually find their way into Esso Research and Engineering laboratories for study by engineers and scientists, into research reports, into visual aids—for technical lectures, for employee training and for public relations programs. The company newspaper uses hundreds of the pictures. Sometimes record pictures are made of experimental setups and are filed for reference in case the experiment must be repeated. Others are seen by millions of people, as news or advertising in the country's newspapers and magazines.

If the picture is for scientific purposes, company policy forbids the photographer from performing any retouching or even darkroom manipulation. On the other hand, an assignment may call for creativity of every sort—even non-photographic, such as artwork for slide shows.

Music hath charms

Esso Research and Engineering Company provides Carrar's men with a photographic installation (blueprint, *pages 34, 35*) occupying 12,000 square feet of floor space for their diverse pursuits. It is professional working space with some attractive extras. Piped-in music dispels some of the gloom of long stints over a developer tray. Ac-

PHOTO UNIT'S camera delves into Esso radiation lab for photo of remote-control radioactive "hand."



TOP BRASS of Esso Research inspect data processors in high-angle publicity photo.

ENGINEERING shot displays wear on gear from auto's rear axle for lubrication studies.

curate temperature control is assured by mixer faucets supplied with hot, cold and chilled water. Voltage control for color printing work and nitrogen burst agitation (automatic, intermittent release of nitrogen bubbles through processing solutions) for color transparency developing suggest respect for careful technique.

The many innovations in photographic techniques are in part due to Carrar's having each man handle all phases of his own work. It alerts seven minds to improved equipment and short cuts.

Besides the basic 4 x 5 Speed Graphic kit which each man is assigned, the staff has an array of cameras and accessories for making photographs of every size from 35mm to 8 x 10 in. The motion pictures are shot on 16mm; and if the subject is of a confidential nature, the photographer has the equipment at hand to process the film himself.

The heavy investment and substantial operating budget do not represent a corporate lark.

The photographic unit, under the Products Research Division of Esso Research and Engineering Company, must justify its budget in terms of the value of its work to the research efforts of the

EQUIPMENT: Speed Graphic is the basic tool

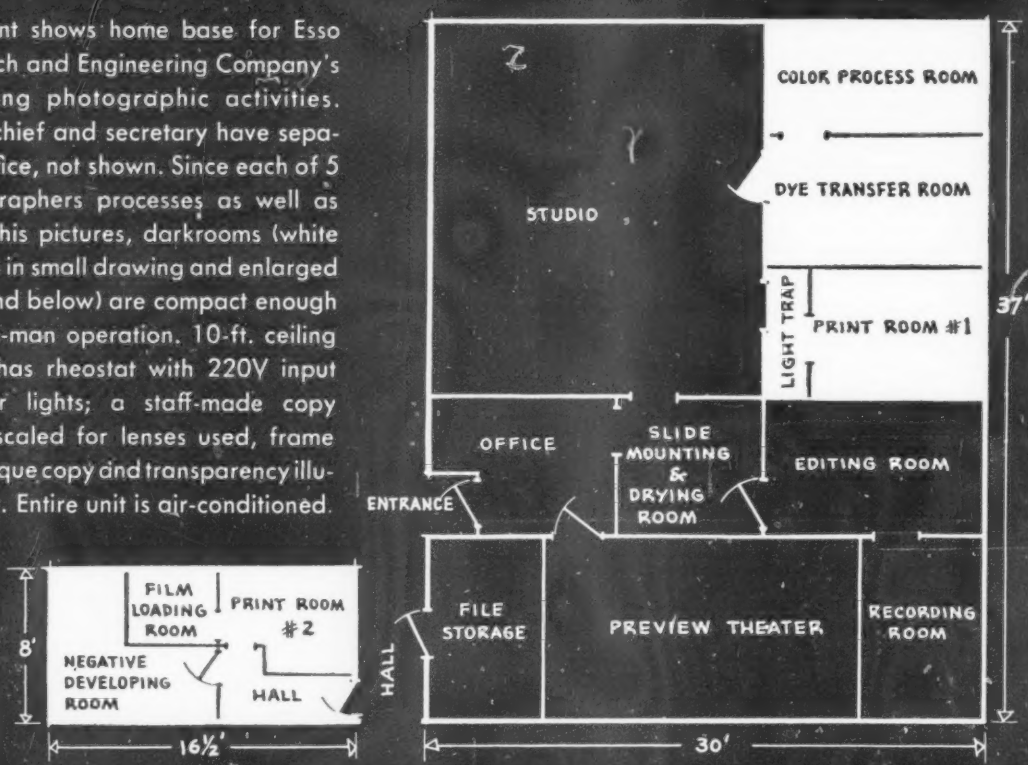
Each photographer at Esso Research's photo unit is supplied with a basic kit consisting of a 4 x 5 Speed Graphic, holders, a flash gun with extension, a Heiland Strobonar IV with extension, a film pack adapter and a 120 roll film back.

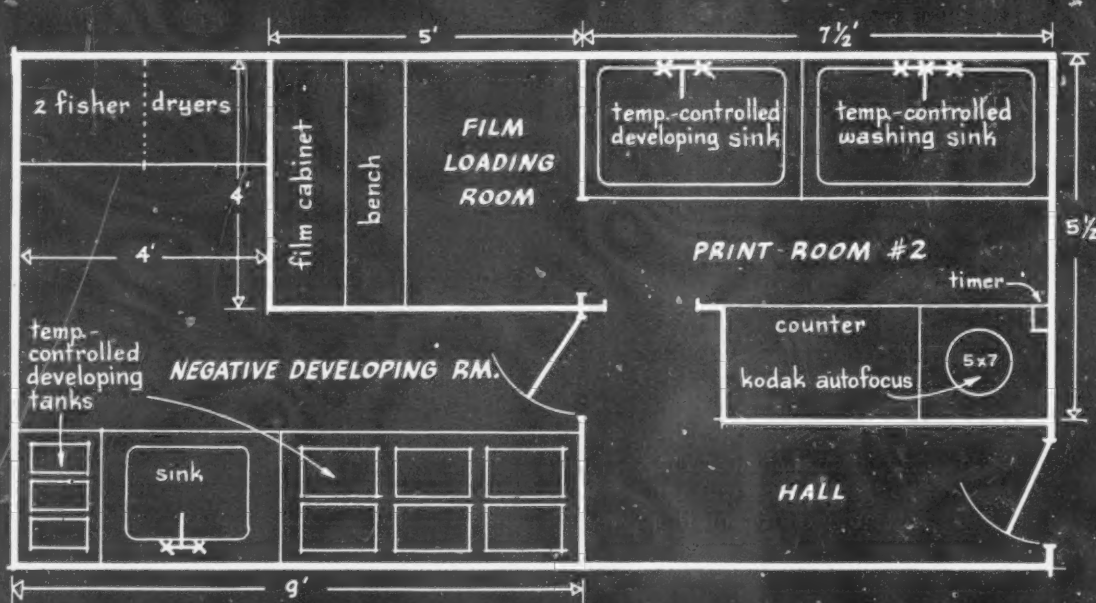
In addition, photographers have access to other cameras, including: Six Ansco, Graphic and Kodak view cameras, 8 x 10 to 4 x 5 in size. Two 2¼ x 3¼ Speed Graphics. A Hasselblad and two Rolleiflexes. Eight 35mm's—an Exakta, Leicas and Signets. Five 16mm movie cameras—a Bolex, Cine-Kodak Specials, a Kodak High Speed Camera.

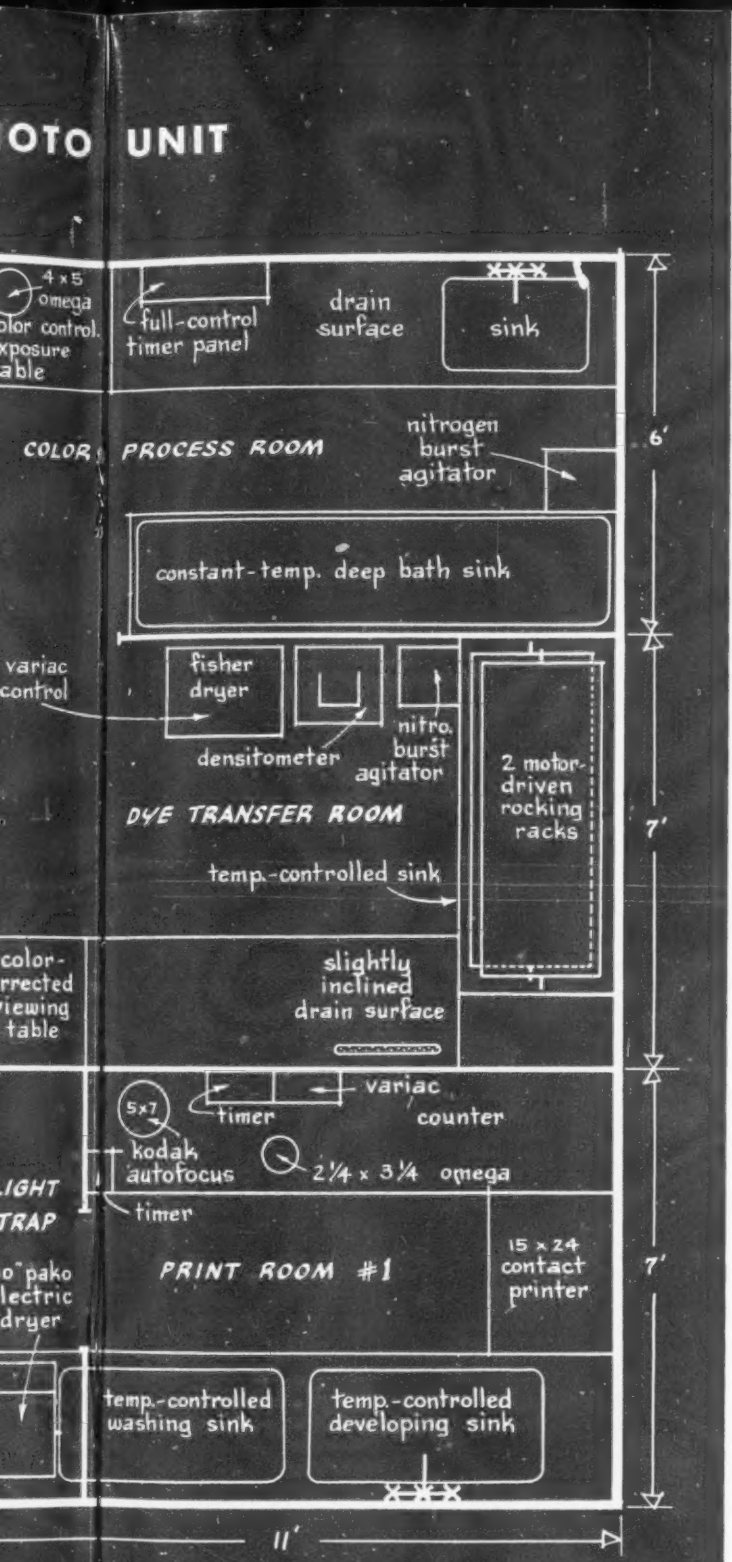
BLUEPRINT: ESSO'S FACILITIES FOR RESEARCH PHOTO U

1,200 square feet divided for black & white, color, motion pictures and audio recording

Blueprint shows home base for Esso Research and Engineering Company's far-flung photographic activities. Photo chief and secretary have separate office, not shown. Since each of 5 photographers processes as well as shoots his pictures, darkrooms (white on blue in small drawing and enlarged right and below) are compact enough for one-man operation. 10-ft. ceiling studio has rheostat with 220V input line for lights; a staff-made copy bench scaled for lenses used, frame for opaque copy and transparency illuminator. Entire unit is air-conditioned.







company. If an outside studio or other supplier can provide work of equal quality faster or at less expense, the outsider gets the job.

In this way, operating practically as an individually-owned industrial photography studio, the department has been built to its present size and strength. Part of its success is due to the Esso Research and Engineering Company's awareness of the value of the industrial photograph. In this, the unit had a head start. The company has had at least one full-time photographer since it became a corporate entity in 1927. The original equipment was admittedly crude: a rustic camera sans shutter (a lens cap was its substitute). But even the first photograph, a picture of a brick soaked in oil to prevent liming, was a worthwhile aid to the company.

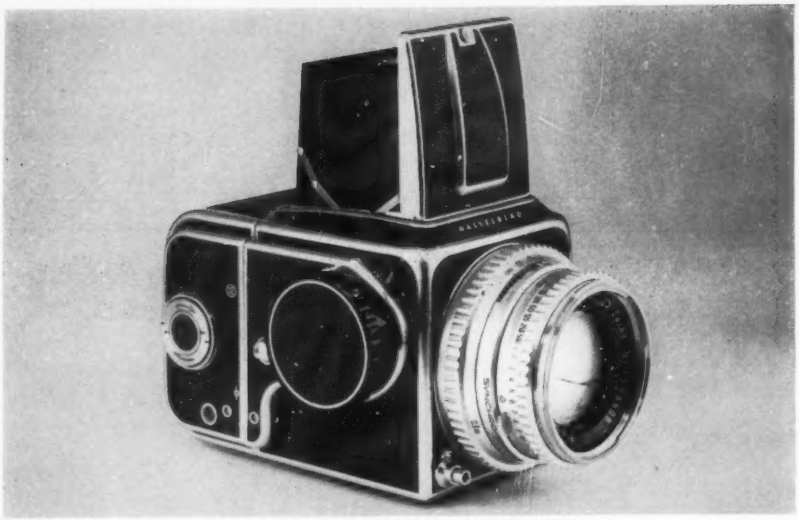
While much of the output of the unit is for the engineers, scientists and technicians of the Products Research Division of Esso Research—Carrar's men do considerable work for 14 other groups in the company (chart, *page 32*). Still other groups in Esso Research with special photographic needs have photographers with facilities of their own.

New challenge: color

A very recent part of the photo unit's work is its handling of color assignments. The men usually shoot an Ektachrome or Anscochrome transparency with a 4 x 5 Speed Graphic equipped with a 2¼ x 3¼ roll film back. In addition, they shoot a Kodacolor negative with the same camera on another 2¼ x 3¼ back. They develop the transparency themselves, but the Kodacolor films go to Eastman to be processed and printed. The print is filed with the negative and the transparency. If the work requires a lantern slide, the photographer binds the transparency in glass. If a black-and-white print is ordered, he makes an 8 x 10 from the Kodacolor negative. If color prints are needed, he prints everything up to 8 x 10 on Type C paper. If anything larger than 8 x 10 is required, a Dye Transfer print is made from the transparency.

Thirty years of experience have led to a filing system which is simple and workable. Carrar's secretary files negatives, color prints and transparencies by date. She keeps a scrapbook of black-and-white prints. A card—containing the name of the originator of slide requests, the date and other pertinent information—is filed under the name of the person who made the request.

With 5,000 new negative envelopes being added to the files every year, keeping things in order is a rough assignment—but Esso Research's photo unit does it with well-oiled efficiency. THE END



SPECIFICATIONS: Hasselblad 500C 2¼ x 2¼ single-lens reflex camera has fully synchronized between-the-lens Synchro-Compur shutters in interchangeable lenses. The bayonet mount lenses have their own shutters with completely automatic diaphragms plus MX synchronization and built-in selftimer.

Rear auxiliary shutter in camera body prevents film exposure during lens changes but can also be used as secondary shutter for scientific work, such as extreme close-ups. This shutter is also synchronized.

Winding knob of the 500C is removable, and can be replaced by a built-in LVS single scale exposure meter.

Other features: interchangeable film magazines and focusing hoods; a set of movable depth of field indicators placed at the top of the lens; European and American tripod threads, plus a special rapid mounting rail for quick mount tripods.

The normal lens for the Hasselblad 500C is the 80mm f/2.8 Zeiss Planar. Accessory lenses are the 60mm f/5.6 Zeiss Distagon; the 150mm f/4 Zeiss Sonnar; and the 250mm f/5.6 Zeiss Sonnar.

IN-PLANT TEST

Western Electric photographer tests the radically-new Hasselblad 500C with between-the-lens shutters in interchangeable lenses

Joe Gazdak, photographer for Western Electric reports: Here at Western Electric we do a great deal of work in 2¼ x 2¼ for the industrial publication *WE*, the magazine *The Engineer* in which we do a lot of technical work, national and local advertising plus brochures. I've been using Hasselblads as long as I've been working on the magazine and even before. Although I like a twin-lens reflex there simply wasn't one with versatility of lenses. However, the older Hasselblad was quite limited because of its focal-plane shutter. For instance, it was impossible to use with electronic flash, at least for me. The necessary slow shutter speed of 1/25 sec. produced a secondary ghost image because of the existing light in many of my shooting situations. I simply had to use a twin-lens camera with between-the-lens leaf shutter. I had another complaint about the old Hasselblad. Often it was necessary to shoot at speeds of 1/25 sec. or slower. With the 1000F model you had to use a tripod at anything below 1/50 sec. In addition to these two complaints there were other problems. We're called on to do a lot of action photography. The old Hasselblad had a pre-set diaphragm. You could lose a picture between the time you decided to shoot the picture and the time the shutter release could be pressed. There were times also when the winding mechanism would break down and there wasn't anyone within 1000 miles to fix it.

Actually, although they seem major, these were minor complaints since the Hasselblad offered such versatility in operation that no other camera in this size came near it.

The new 500C model can't really be compared to the 1000F. It's like comparing a '58 Cadillac to a '48 model. I've hand-held the new camera at speeds even as slow as ½ sec. and gotten sharp pictures; I can use electronic flash at any speed up to 1/500 sec. You can't lose a shot while closing down the diaphragm since it's done automatically.

I found the new normal 80mm lens to be a terrific improvement over the old Tessar and Ektar lenses previously available. I brought some color back recently from one of our plants which was spectacular in brilliance and sharpness. Although it's easy to credit a lens for sharpness even at full opening I find it hard to believe that the lens itself is responsible for the terrific color results. But there they are.

There are a few complaints. I'll still have to hang on to the old Hasselblad when I use a 400mm lens. Can there possibly be some way of adapting the older lenses to the new camera? (The bayonet mounts are completely different.) If there isn't some method there are going to be an awful lot of photographers stuck with the old camera yet unwilling to give them up for the new. The bayonet lens mount incidentally works quite easily when you interchange lenses even though it's a bit of a problem since you can only change lenses when the camera and shutter are fully wound.

I'm not quite sure I like the idea of an interchangeable film wind knob. Although it has a pretty clever catch and can be taken off easily I'm afraid that some day it might fall off by mistake while on a job. I'd just as soon have it fastened permanently, but this is minor.

Summing it all up, I'm all in favor of the new Hasselblad. With it I'll be able to go out with one single-lens reflex instead of a host of different cameras. Here's a manufacturer who seems to have done an intelligent job of redesigning a very important piece of equipment for the industrial photographer. THE END

by BERNARD HOFFMAN

QUESTION & ANSWER

QUESTION: I have to make copies of color transparencies and would like to use my electronic flash lights. How can I compute my exposure?

ANSWER: This is done very simply. Take any incandescent light source. Place this light source in the exact spot in which you plan to have your electronic flash lamp. Now, take any light meter and point it at the light source. Fix the light meter in place so that it can't be moved during the test. Take a light reading. Take the piece of opal glass you plan to use. Place it between the light source and the meter—in the exact position it will occupy when you finally make your transparencies. Take a second reading. The difference between the first and the second readings will tell you how much light is lost because of the opal glass. Put your electronic flash unit in place, measure the distance from the flash unit to the transparency and divide this distance into your regular guide number (it has been my experience that the guide number is the same whether the light is passing through a transparency or falling on a subject)—then increase your aperture to compensate for the loss of light in the opal glass and for bellows extension, if any.

QUESTION: I have a printing problem. Sometimes I can go into my darkroom and turn out 20 prints with ease. At other times I'll be able to develop only three or four prints in the same time—even though the negatives are pretty much the same. Is my problem photographic or psychiatric?

ANSWER: There are people called "professional printers," who print every day of the week. Regardless of the kind of negatives they have to handle, they print a predictable daily output. One of their trade secrets is using long exposures. Here's how it works.

No print is ever exposed for less than 10 secs. (basic over-all time). The longer the basic exposure, the greater the margin for error. There are good reasons for this.

When an enlarging bulb is turned on it takes a certain period of time to warm up to maximum brilliance. This varies somewhat each time the bulb is lit. This can become a very large portion of a short exposure—3 secs. or so. When spread over a 10-sec. exposure this becomes so negligible as to be non-existent.

Now, suppose we make a 10-sec. exposure and we goof by one second. This still is not a serious situation. A little manipulation and prolonged development can cover this minor error. But suppose we fall 1 sec. short on a 3 sec. exposure—see what I mean?

As a starter, I would strongly recommend a standard 10- or 20-sec. basic exposure. Don't try to set any speed records for printing—it's not that kind of a business. Try to pace yourself within the limit of your capabilities. It's more fun and more productive that way.

QUESTION: How can I make a process copy of something printed in purple ink by the Ditto process?

ANSWER: Shoot through a filter of a color complementary to the color you wish to reproduce as black. In this case, a green or yellow filter would probably do best. You can test for the proper one by viewing the copy through a series of filters. When the letters in the copy appear black, you know you have hit the right one. Use panchromatic film.

QUESTION: Can I use one developer for Royal-X Pan and for slow films as well?

ANSWER: Yes. D-76 or DK-50 will do well for both. DK-50 diluted 1 to 1 will produce a slightly finer grain structure on slow 35mm film than it would used straight, but it should not be diluted for Royal-X Pan because using diluted DK-50 increases the fog level of Royal-X Pan.

QUESTION: Can I do something about fast films for outdoor movies?

ANSWER: Yes, avoid using them. Fast films are special purpose films and are not designed to give best results in bright sunlight.

QUESTION: Kodak doesn't recommend inspection development of Royal-X Pan. Can it be done?

ANSWER: Many professional photographic processing laboratories regularly inspect Royal-X Pan. This is done by highly skilled and experienced technicians who can read a negative or roll of film in 3 secs. or less under a weak green safelight (after their eyes have become thoroughly adjusted to the dark). This calls for a high degree of experience and skill to avoid fogging, as Royal-X Pan is highly sensitive to all darkroom safelighting. Eastman is aware of this and therefore does not recommend inspection as a general procedure.

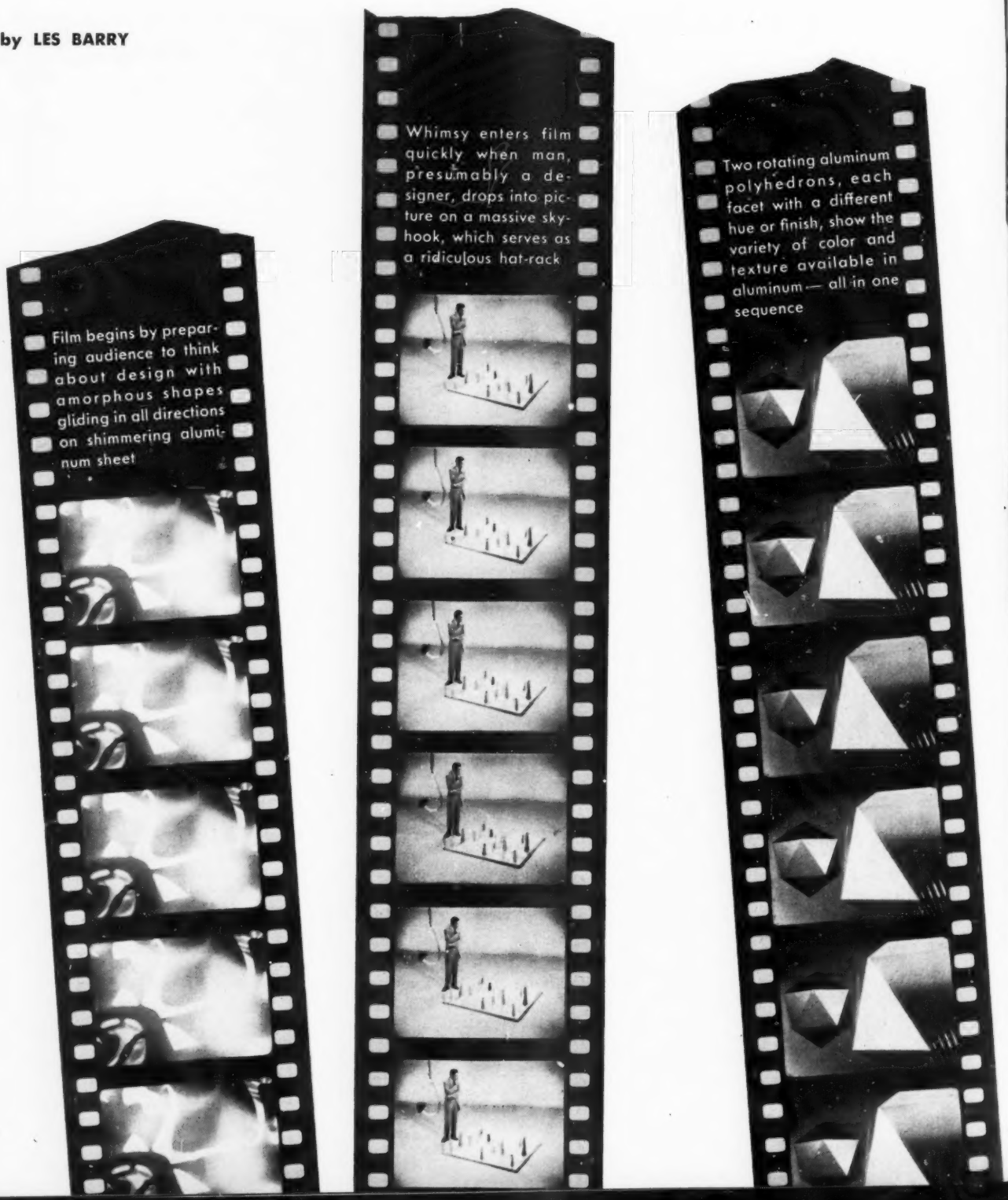
QUESTION: I live in a "hard water" area. What can I do to avoid some of the headaches of trying to mix developers, etc., in hard water? I was told that the only solution was to use distilled water. This seems to be a pretty expensive remedy.

ANSWER: I would suggest that you add a small amount of Calgon to your water. Use it sparingly—about 10 grams per qt. to start with. Then adjust it to suit your need. I can't be more specific than this without a *p*H reading of your water supply. The addition of Calgon may have a tendency to speed up development slightly. Do not regard this in the light of an increase in film speed. Rather adjust to it by shortening development time—otherwise you may wind up with more grain than you're used to getting.

What's your technical problem? Ask Bernie Hoffman. It's simple, just write: Questions Editor, P.M.I., 33 W. 60, New York 23, N. Y.

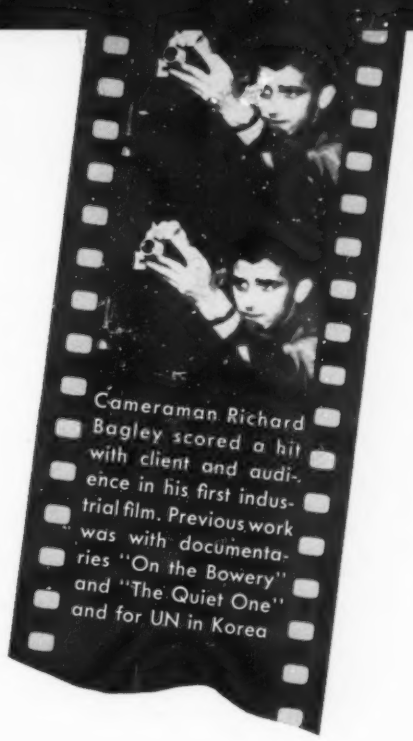
ALCOA'S GREAT NEW

by LES BARRY

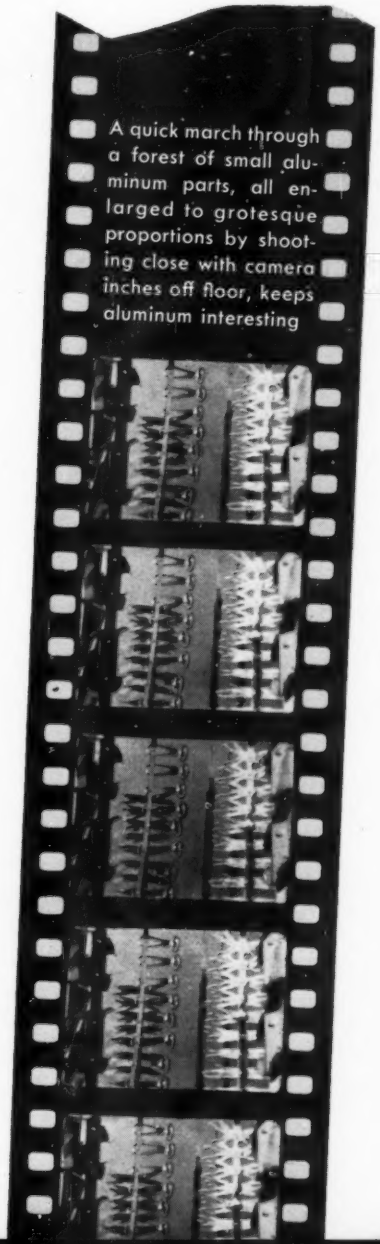

Film begins by preparing audience to think about design with amorphous shapes gliding in all directions on shimmering aluminum sheet
Whimsy enters film quickly when man, presumably a designer, drops into picture on a massive skyhook, which serves as a ridiculous hat-rack
Two rotating aluminum polyhedrons, each facet with a different hue or finish, show the variety of color and texture available in aluminum — all in one sequence

MOVIE

How radical, but simple, techniques were used to make an outstanding 18-minute film full of inventive cinematic ideas



Cameraman Richard Bagley scored a hit with client and audience in his first industrial film. Previous work was with documentaries "On the Bowery" and "The Quiet One" and for UN in Korea



A quick march through a forest of small aluminum parts, all enlarged to grotesque proportions by shooting close with camera inches off floor, keeps aluminum interesting

When On Film, Inc., began making the movie about the various textures and color qualities of aluminum, it was sure of only one thing—what the client did not want. The client, the Aluminum Company of America, did not want a "nuts and bolts" film.

Alcoa's positive directions to the producers were for a type of movie so original that it would resemble nothing its audience, the country's designers and architects, had ever seen. They were to be shown the creative possibilities of aluminum, and they were to be stimulated to consider using aluminum for everything from machine parts to skyscraper fronts. Alcoa had no interest in showing the audience how aluminum was made; they wanted the members of the audience to know what could be done with the metal after the manufacturing process was completed. And On Film was reminded that designers and architects could be considered a very critical audience.

The man for the job

The producers examined and re-examined the project, and decided to give the script and a free hand to a documentary motion picture cameraman. They selected Richard Bagley, whose "On The Bowery" won first prize for documentaries at last year's Venice Film Festival. Bagley had won previous acclaim for "The Quiet One," as well as documentaries for the United Nations in Korea and the Israeli government.

By the way of general orders, Bagley was advised that each shot in the 18-minute film was to be a creative, artistic thing, but that every shot,

even the most abstract, was to contribute to the story line. A tough assignment, could anyone do it? Attesting the success of the effort were a congratulatory telegram to On Film which the president of Alcoa sent upon seeing the first print of the movie, and the enthusiastic words of reviewers:

"The motion picture is such a new departure for films of this type that it presents several interesting problems. By its very quality it asks to be judged as art and demands an altogether different set of critical values than are usually applied to industrial films . . . It deserves and is likely to get a far wider audience than that for which it was intended."—*Printers' Ink*

"This superlatively conceived and executed feat should stimulate anyone. [The film's] most formidable wizardry would appear to come straight from the color camera of Bagley . . . [who] will have to go far to beat this."—*The N. Y. Times*

No titles, fast start

From its very opening the movie is startling. There are no titles; instead the narrator explains briefly that the film will side-step the question of good design in typography and merely demonstrate Alcoa's specialty, aluminum. Meanwhile, the audience begins immediately to think about the artistic possibilities in aluminum while they watch a sequence of abstract colored shapes gliding every which way on a sheet of metal.

Here's how the opening sequence was made. Shapes were cut out of a cardboard drum, and the holes were covered with sheets of colored gelatin. A light was placed inside the drum. The drum was rotated on a turntable, and the colored light was thrown against a sheet of polished metal, on which the camera was trained. The metal was flexed back and forth.

After the audience is prepared to think about aluminum, the film cuts to a starkly simple scene, in which are featured a tableful of aluminum products, a giant aluminum hook (apparently suspended from a crane, which is not shown) and a man. The man, an unidentified actor, presumably represents the typical designer or engineer who is about to be whisked through the world of aluminum. And whisked he is. Seating himself onto the hook, the man is carried aloft. He is seen, briefly, on and off, during the film. He is used as a series of punctuation marks to present an occasional note of realistic balance to the fanciful nature of the movie.

Although the project was not a particularly high-budget one, On Film gave it the all-out treatment. Bagley worked with a crew that included two electricians, two grips, a prop man, a make-up man, a scene designer, three carpenters, and an assistant cameraman. The bulk of the movie was shot in On Film's Princeton, N. J., studio, but the crew was sent out on location at the slightest provocation—with the result that footage was exposed in Pittsburgh, Pa.; Atlanta, Ga.; Alcoa, Tenn.; New York City and the Jersey shore.

Perhaps one of the film's larger successes, from the standpoint of Alcoa, is that it covers dozens of possibilities and situations in its brevity, and yet never gives the viewer a feeling that he is being bounced around. This was accomplished by making each transition a part of the story.

Ripples in matched blue

Bagley did such things as, in one case, having an enormous sheet of blue aluminum suddenly begin to ripple and become the water in the dam that supplies the power for making unlimited amounts of aluminum. To accomplish the transition, he used a Polaroid filter when shooting the water. The filter adjusted the blue of the water to match exactly the color of the aluminum. The two sequences dissolved into one another beautifully.

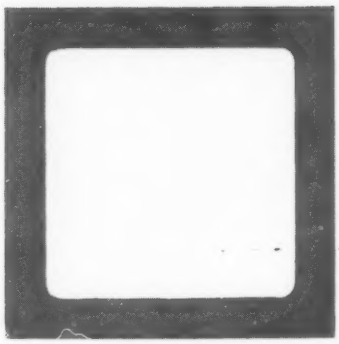
In other sequences, he combined shots of aluminum products and the machines on which they were made by photographing the machines through filters of exactly the same colors as the products. The audience, then, goes from one product to machine, back and forth, with never an aesthetic jolt.

To show that different textures have varying effects, depending on distance and surroundings, Bagley began one sequence with a close-up of a buff-finished aluminum doorknob. Dollying away from the subject, the camera took in the ridges on the aluminum door, and the texture of the doorknob seemed to become smoother. He continued to dolly back until the ridged wall of the building in which the door was set was included, and the texture of the door appeared finer.

Restrictions discarded

In watching the movie, the viewer becomes aware of the fact that many of the restrictions of color photography are completely discarded or ignored. The basic rule of never extending brightness range beyond three to one seems to receive little, if any, respect. In some sequences the highlights are as much as twelve times as bright as the shadow areas, but the result of this wide range is always favorable *(continued on page 57)*

The newest size slide is rapidly gaining acceptance. Here's a rundown on its advantages over standard 35mm and 2¼ x 2¼ formats. How it works, what equipment and materials you need.



SUPER SLIDES: IDEAL COMPROMISE?

The 2¼ x 2¼ film size is about the smallest many industrial photographers are willing to consider, although some have long embraced the 35mm. While the question of what the minimum film size should be for fine quality may never be settled, there seems to be a truce in sight in the matter of color transparencies. Promise of peace lies in the compromise offered by the super slide, a format between the two in size.

Advantages of large transparencies

The larger sizes (2¼ x 2¼ and larger) do offer a bigger image and the advantages that go with it. Bigger images reduce the objectionability of grain almost in proportion to their size. And today's fast and ultra-fast color films have a grain that is more obvious than the older, slower emulsions. This fact lends weight to photoengravers' arguments against tiny color copy. In the matter of picture taking, only with the larger sizes do you get the view camera's control of distortion and depth. The larger image in the transparency, furthermore, makes possible a correspondingly larger image on the projection screen. While this concerns the occasional 35mm photographer but little, it enlarges the possible size of the audience—something of vast importance at times to the professional.

The bigger the better?

With all its advantages, the big transparency has some drawbacks.

One, of course, is expense. Another is the fact that the larger film needs the support of cover glass to avoid buckling under the heat of projection equipment, while 35mm transparencies can get along with only the stiffening of the color processor's cardboard mounts. The thickness and fragility of the cover glasses plus the size of the large transparency add up to a storage headache.

When it comes to projection equipment, the 35mm format holds the edge over larger sizes for convenience and economy. The 35mm projectors are easier to lug around. They are capable of using wide aperture lenses of short focal lengths which give big, bright projections in small spaces. They are readily equipped with handy changing devices. These changers are especially important in industrial visual aid work where a degree of smoothness in presentation is necessary—and where facile changing manually, by remote control or automatically can spare a projectionist or allow a salesman to deliver his pitch without the embarrassment of showing his wares upside down, backwards or out of order.

The super slide compromises between the large and the small formats by offering most of the advantages of both.

Undoubtedly you're familiar with this new breed of transparency, but here's a definition: A super slide is a transparency or a section of a transparency of most any size which is cut down to 38 x 38mm (about 1⅝ in. square) and mounted in a 2 x 2 cardboard or glass mount. The 35mm slide is, by contrast, a 24 x 36mm transparency in a 2 x 2 mount. With the same outside dimensions, the super slide casts an image on the screen a full two-thirds larger in area than the 35mm slide.

Quick change

The super slide fits easily into the new 2 x 2 automatic changing devices. Its image is covered by the lenses and optical systems of many modern 35mm projectors. While the slide holders of some of the older projectors have an octagonal shape which obscures the corners of the super slide, they can be adapted for the super slide by filing the corners square. The new format fits with facility into automatic changing magazines. In short, it makes nearly maximum use of the 2 x 2 slide mount and is practically interchangeable with the 35mm version.

If the transparency intended for super slide mounting is masked in the camera before shooting, most color processors will return it already mounted in cardboard.

On the other hand, it is a simple matter to shoot the picture full frame and trim the transparency after processing. Cropping, normally not employed by the photographer in 35mm practice, is simple with the super slide. You use the

(continued on page 67)

James R. Root

William C. Herman

PORTFOLIO:

Two Eli Lilly and Company photographers focus on imaginative industrial photojournalism

"We feel that we must compete with all national circulation magazines for Lilly employees' reading time." This is the attitude which spurs two industrial photographers, James R. Root and William C. Herman, to look for the compelling element in their illustrations for Eli Lilly and Company, Indianapolis, Ind.

The two men alone supply the photographs for *The Lilly News*, an employee newspaper, and *The Lilly Review*, a bimonthly employee magazine. They are responsible for whatever pictures are needed by Lilly's Employee Communications and Public Relations Departments. They take on additional assignments in still and motion picture photography for other divisions of the world's largest ethical pharmaceuticals manufacturer.

Both Root and Herman are former newspaper photographers. Root was a staff photographer for the Akron *Beacon Journal* before coming to Lilly. Herman was a staffer for the Indianapolis *News* until he joined Root.

Because they have much to do, they work with speed. But the fact that Root and Herman practice with the conscience of artist and craftsman is displayed in the pictures on these six pages of PMI's first portfolio.

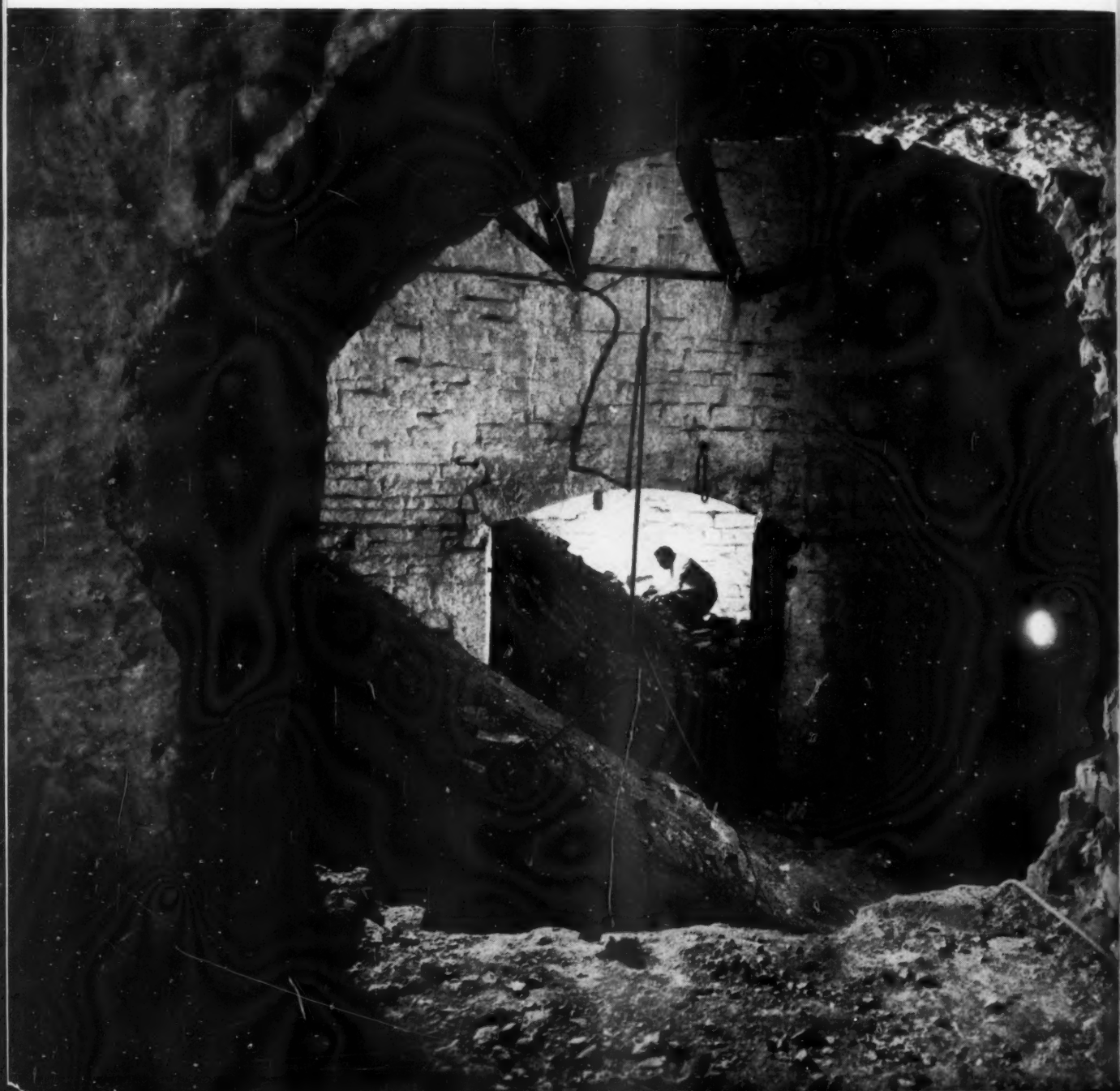
It is a sampling of the many pictures Root and Herman make each month with an industrial photojournalist's goal in mind: give fellow employees fair exchange for their valuable reading time.

CANCER TISSUE CULTURE, keeping malignant cells alive and reproducing outside the body, was photographed by William C. Herman for Eli Lilly's Public Relations Department in answer to a request by the American Cancer Society. This picture and a number of others by Herman were used in a display on cancer research. He exposed Tri-X film in a Rolleiflex with a Xenotar lens for 1/25 sec. at f/11, compensated for underexposure with a 12-minute Promicrol development.

PORTFOLIO (*continued*)

SATISFYING employees' curiosity about brewery caves discovered during excavations for a new Lilly building—James R. Root made picture *below* with a 90mm Wide Angle Optar lens and a single SR electronic flash unit for *The Lilly News*. He placed camera on tripod, told model to hold still, opened shutter, walked through caves flashing unit six times. 4 x 5 Royal Pan, f/16.

INTRICATE TECHNIQUE resulted in picture *right* intended as a "stopper" in a story about Lilly's glass blowers in *The Lilly Review*. The photographer set up his equipment in front of a black background. Glass blower began blowing bubble. When it got French-bread size he moved in front of camera. Shutter was opened for time exposure. One electronic flash unit was set off manually at the sound of a crack when a thrown paper clip burst glass bubble. An electric eye set off a second electronic flash. 4 x 5 Speed Graphic, Royal Pan, f/16.



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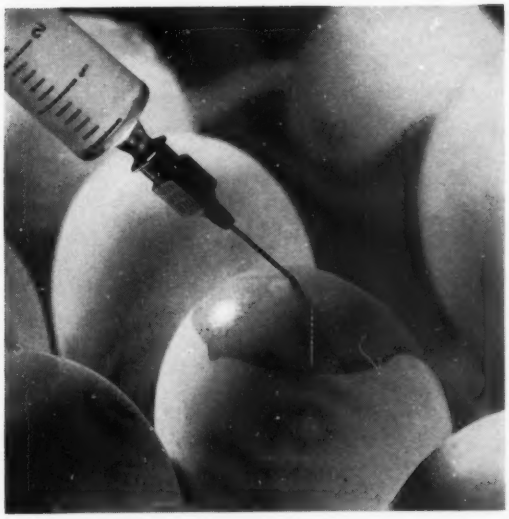
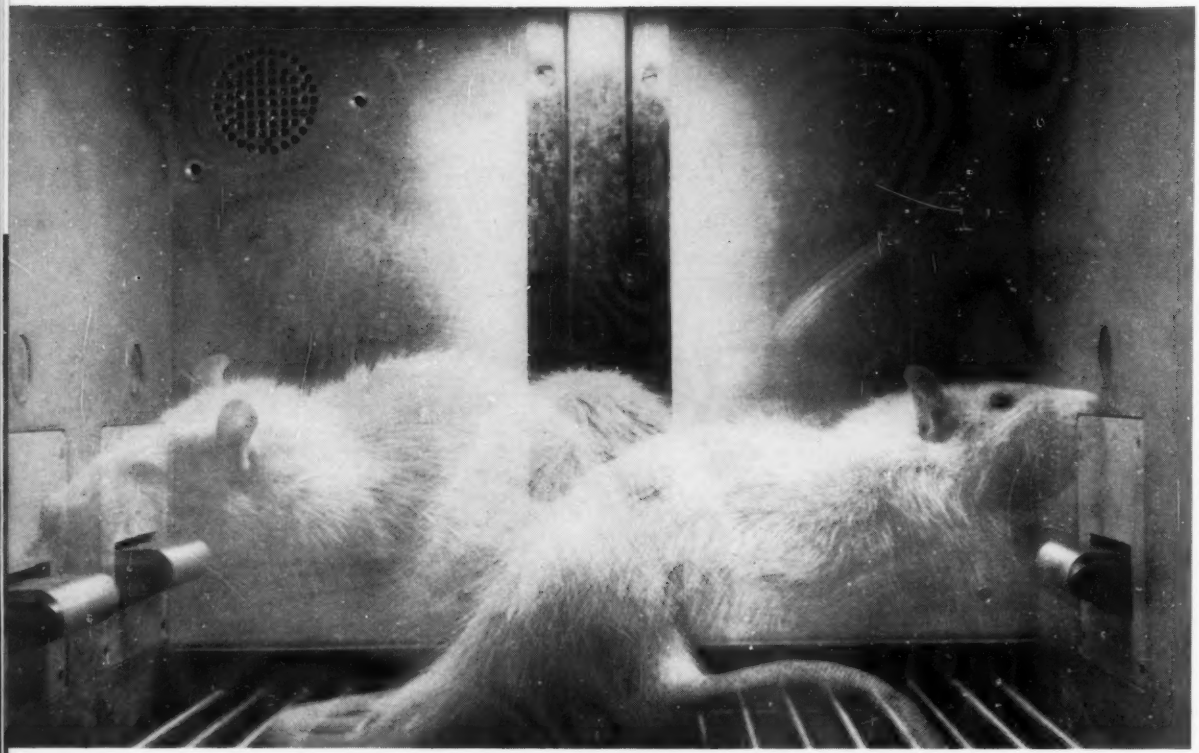


LIVE DUCK EGGS injected with a virus produce rabies vaccine. Close-up of injection made a cover picture for *The Lilly Review*. Camera was a 4 x 5 Graphic View with an 8-in. Commercial Ektar lens. Three spotlights gave exposure of 1/25 sec. at f/5.6 on Kodak Royal Pan.



UN-TRANQUILIZED RAT was the lead picture in *Lilly Review story* about behavior research on the effects of drugs. Editors wanted to show the busy movements of an anxious animal before treatment with tranquilizers. A 4 x 5 Pacemaker Graphic was set on a tripod in front of the rat's cage in the Lilly laboratories. One SR electronic flash unit was directed down from 8 in. above the cage. A sheet of writing paper and a sheet of milk glass cut down light. Triple exposure at f/32 was made on Royal Pan.

ELI LILLY, board chairman of company, was photographed in the library of his home. Said photographer Root, "He has enough honorary degrees to fill both sides of a diploma and is an author as well. I wanted to portray part of his character, the man of books. This was the obvious place." Root placed his Rolleiflex on the floor, exposed ½ sec. with diaphragm shut down to f/16 for depth of field. He gave Tri-X film an arbitrary exposure index of 650 Weston for the series of shots of Mr. Lilly for *The Lilly Review*. Film was developed 12 minutes in Promicrol.

RECIPROCITY FAILURE

You're an industrial photographer with the problem of photographing a long factory interior in poor light. You stop your lens down as far as it will go, calculate your exposure carefully with an exposure meter and make the picture. Result? Practically no image on the film if it's black-and-white, incredibly bad hues if it's color. Is the meter or the film at fault?

Perhaps you've an assignment which requires an extremely high speed electronic flash. Again you carefully calculate exposure and are amazed to find practically no image on the film. If you've used color film it looks as if the flash, supposedly perfectly balanced for color, has betrayed you. Does it need repair or is the shutter out of sync?

The answer to all these questions is not the obvious. The fault lies not with the meter, the film, the flash, the synchronization. The fault isn't a fault at all. It is a fact of exposure that every photographer runs into sooner or later—reciprocity failure. And even though you may feel it pretty unnecessary to learn why the phenomenon happens, it's very important to know when it happens and what you can do about it.

Briefly, reciprocity failure is a direct contradiction to the well-established law stating that you can always shoot twice as fast if you double the light. This statement generally works out pretty well in practice, but all photographic films and papers show the failure of this law to some degree. They produce weak images when exposed at high speeds or in extremely low light conditions where long exposures are necessary. In between these extremes you can rely on your exposure meter and flash data. Reciprocity failure is there all right but for practical purposes it's negligible.

Although reciprocity failure has been with us since photography was invented, photographers simply explained the failure of their exposures due to this phenomenon as another example of the instability and crudeness of the photographic process. They didn't get much help from film manufacturers either, who published no data on reciprocity failure for them and seldom mentioned the subject outside their own well guarded labs.

The manufacturers simply couldn't keep it under wraps when color film came along. It was just too obvious to photographers that something really screwy was going on. Why should color shots turn out bluish-green when an exposure took several minutes? Why should a shot of the same subject at one second have perfect color balance even though both shots were made on the same piece of color film, side by side?

The whole story was now out in the open. It was no longer a social disease. Reciprocity failure became a subject discussable in respectable social circles. It became a known and understood fact that reciprocity failure occurred in varying degrees in each layer of color film and thus altered the color balance. Manufacturers then admitted sadly that reciprocity failure was characteristic for all films, but not the same for all. That is, one emulsion might lose speed at a faster rate or flatten in contrast to a different extent than another.

With color, reciprocity failure compensation took on the aspects of an out-of-balance nightmare. Increased exposure couldn't possibly be the sole solution to reciprocity compensation. Since the three emulsions of a color film respond differently to reciprocity effects, the color shifts away from the right balance. Therefore, color correction filters would be necessary in addition to increased exposure. Although practical for most ordinary industrial practices, this further compounds the problem in specific scientific applications.

Here, reciprocity failure has been a familiar subject for many years. Astronomers, for example, have had to make close studies of the reciprocity failure characteristics of emulsions. In recording distant stars and nebulae, exposure times are often calculated in terms of *days!* Manufacturers obviously do all they can to alter the reciprocity characteristics of emulsions to favor the particular conditions under which the emulsions are most likely to be exposed, but this has practical limita-

FMI'S expert, Lloyd E. Varden, explains why you get underexposed black-and-white negatives and off-balance color transparencies in extremely high and low light levels. Is there anything you can do? There is. Varden tells how to avoid the problem, how to compensate if you can't.

RECIPROCITY CHARTED

Here is stylized representation of reciprocity, reciprocity failure and compensation for the failure. Reading horizontally are high, middle and low intensities. Vertically, reading up, is greater total exposure.

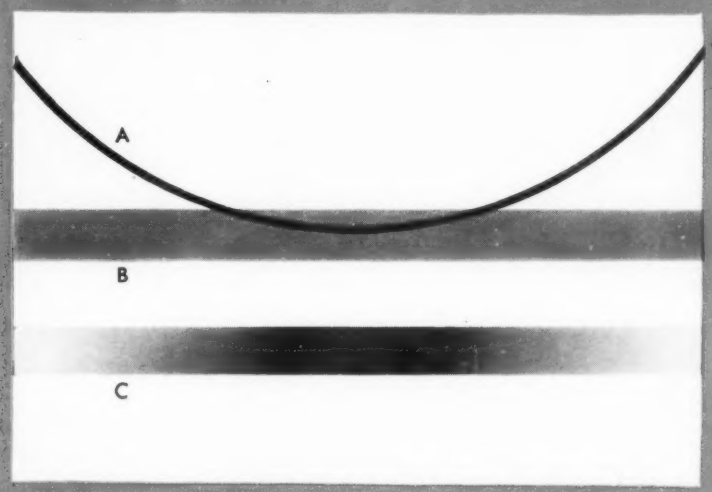
A. How total exposure must be increased, by increasing time or light, to compensate for failure.

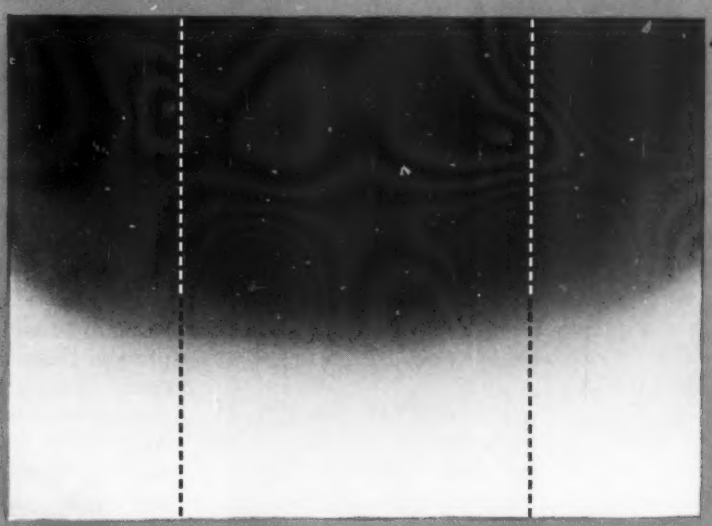
B. If the reciprocity law were observed, the same exposure would be made at all intensities by giving shorter times with brighter intensities and vice-versa.

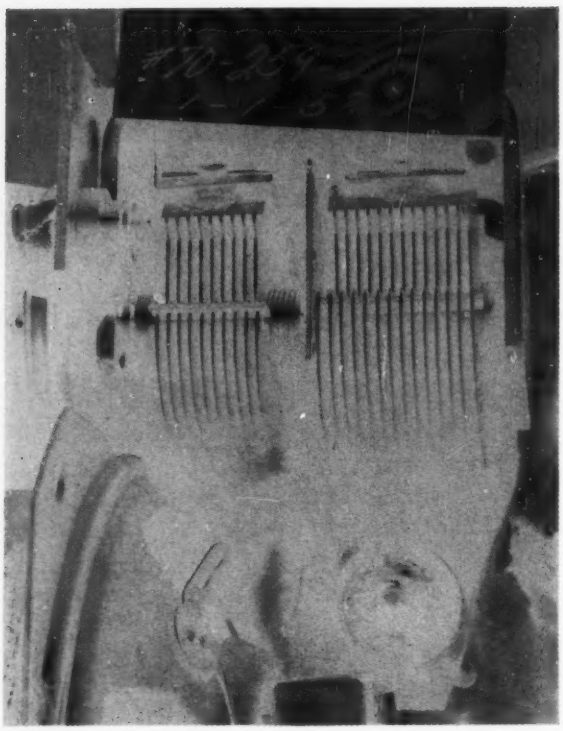
C. Shows how negative density varies due to reciprocity failure—weakest at the extremes of the scale and strongest at the middle.

SECOND CHART, *bottom right,* is an artist's visualization of the effect of reciprocity failure on negative film. It represents the combination of vertical strips of film from an infinite number of theoretically equivalent exposures taken of a gray scale whose brightness increases reading up.

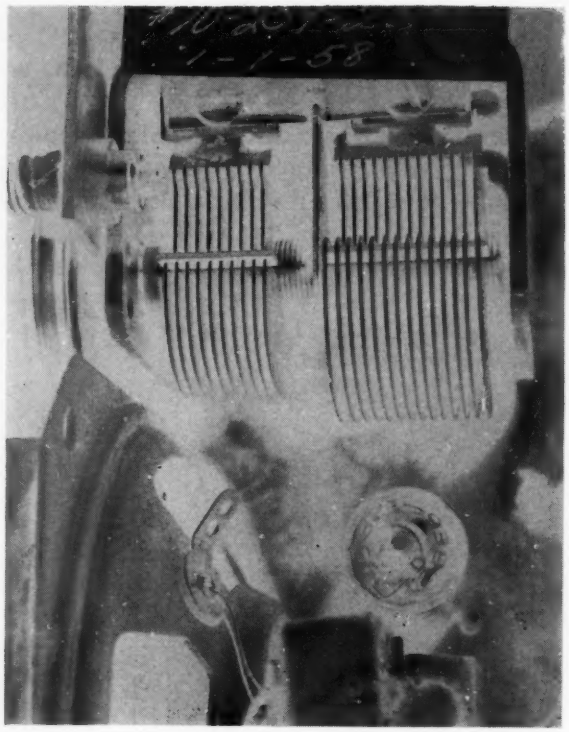
Area between dotted lines is "normal" range, relatively unaffected by reciprocity failure. Shape of curve and position of greatest sensitivity is different for each different type of film.







1/10,000 10,000 units of light



1/100 100 units of light

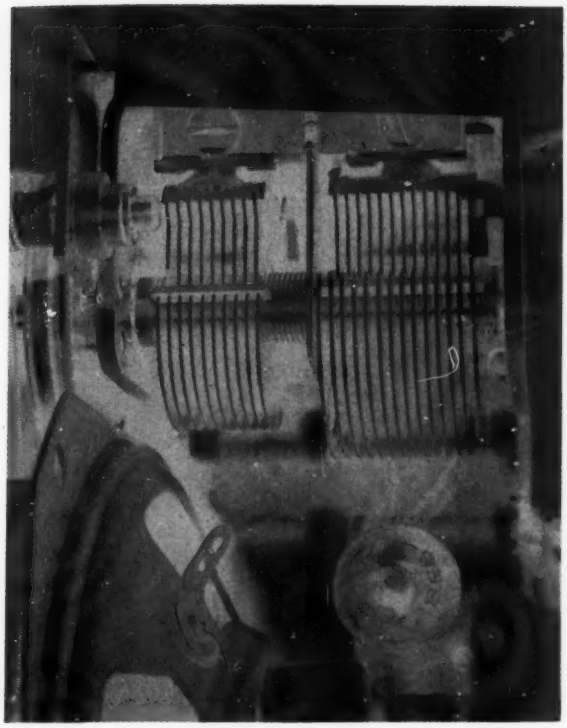
tions. We can hardly expect a special film material for every application of photography, although there is a definite trend in this direction wherever reciprocity failure introduces almost insurmountable problems. At one time color films were made in different types only for meeting the requirements of different light sources as far as color balance was concerned. Today manufacturers are also taking into greater consideration the exposure times involved, and specific color films are available for particularly short exposure times and for fairly long exposure times.

Nevertheless, reciprocity failure will continue to be a problem in practice. The photomicrographer uses for the most part the same film materials as the industrial and commercial photographer. Yet his illumination and optical systems are quite different. He ends up with much less light at the focal plane (in most instances) than do most industrial photographers. Furthermore, the photomicrographer usually seeks a higher order of color reproduction "accuracy" than required in most commercial areas of photography. He cannot always accept an *overall pleasing* rendering of the subject colors, but must strive for the ultimate color fidelity which the particular process can yield within a restricted density range. This often requires the addition of rather dense color correction filters which, irrespective of reciprocity failure considerations, extend the exposure time. A vicious circle is established. The more color correction filters needed, the longer the exposure time becomes. But the longer the exposure time, the more pronounced the reciprocity effects become, requiring further filtering and still greater exposure time.

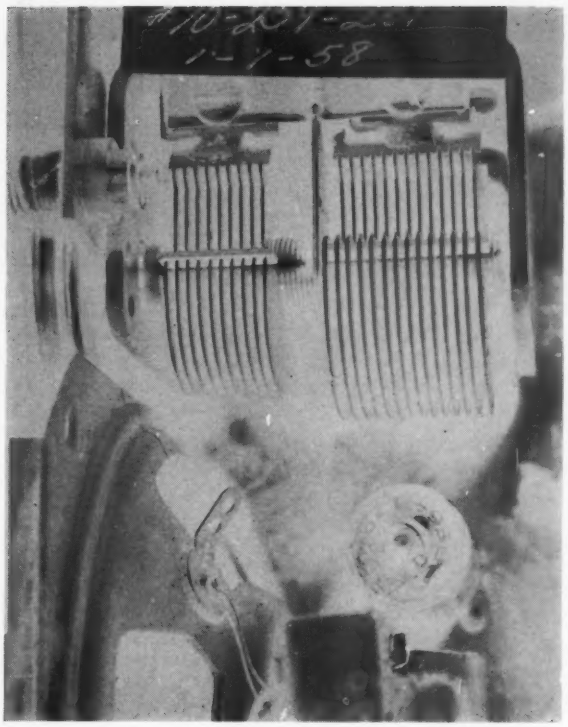
Diagnosis and remedies

It is unfortunate that reciprocity failure can neither be readily recognized nor, as a result, readily remedied in many situations. Remedies can only be applied after recognition. But the effects of reciprocity failure are so kindred to those produced by many other variables in the photographic process that a simple analysis of a negative (or color transparency) fails to isolate particular shortcomings as being due to reciprocity failure. And, except in a very general way, photographers are not equipped to test for reciprocity failure and derive reliable data that can be applied with confidence when new situations arise. Dr. Carl W. Miller of Brown University stated the problem confronting the photographer several years ago in his book *Principles of Photographic Reproduction*. He said:

"Experiments for studying the trend of . . .

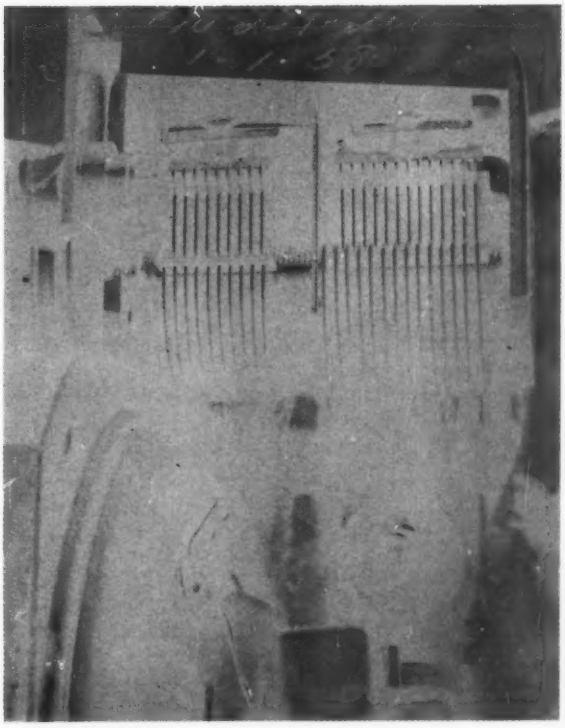


1 sec. 1 unit of light



1 min. 1/60 unit of light

PRACTICAL DEMONSTRATION of how reciprocity failure lessens sensitivity of one film to light at high and low intensities was made by photographer M. Frank Wolfe. For high speed test he used electronic flash, adjusted exposure to ft. lambert figures from manufacturer. Other exposures were made by tungsten light, cut down as time lengthened either by moving light back or closing down aperture. Exposures were determined by meter, double-checked with two other meters; i.e., one-minute exposure was at f/5.6, 33-minute exposure by same illumination at f/32.



33 min. 1/2,000 unit of light

deviations from the reciprocity law demand considerably greater care and precision than are required for the routine plotting of characteristic curves, since both timing mechanisms and photometric instruments must be checked, at least with regard to the relative values which they indicate. Neither shutters nor photoelectric meters possess in general the precision that could be desired, and emulsions vary substantially from one batch to another. *It is probably best for each worker to treat his own photoelectric meter as his standard of light intensity and his own shutter as the corresponding standard of time. By frequent experiment and habits of care-* *(continued on page 56)*

WHAT IS THE CAUSE OF RECIPROCITY FAILURE? VARDEN EXPLAINS

RECIPROCITY FAILURE: A SCIENTIFIC EXPLANATION OF WHY FILM EMULSIONS ARE MOST EFFICIENT WHEN EXPOSED IN LIGHTING REQUIRING SPEEDS OF 1/10 TO 1/1,000 SEC.

General description

For a given photographic material the effect produced upon exposure is governed by two principal factors—the intensity of the light and time during which it is allowed to act. Exposure is defined as the product of these two factors: E (exposure) = I (intensity) × T (time).

If nothing more were involved we should expect the same density to be produced (assuming equal development) on two samples of a film even though one is exposed to 1,000 units of light for 1 second and the other to 1 unit of light for 1,000 seconds. The product of the light intensity and the time of the action is the same in each instance.

Unfortunately, photographic emulsions do not respond in such a manner that constant results are obtained when intensities and times are varied widely despite the product of the two always being the same. In other words, the reciprocal relationship of intensity and time as implied in the exposure equation does not hold in actual practice. Instead, film is less sensitive when exposed under high intensities or low intensities than when medium intensities are used. This has become known as the failure of the reciprocity law, or briefly, as reciprocity failure.

Cause of reciprocity failure

When a photographic emulsion is exposed to light, changes occur in some of the silver halide crystals contained in the gelatin layer that promote their development at a rate much higher than those crystals in which these changes have not taken place. These changes are invisible even under a powerful microscope, and so the potential image existing after exposure is known as the *latent* image.

The latent image is generally thought of in terms of the total picture image which a developer eventually makes visible. However, in the scientific study of photographic emulsions, latent image formation refers to the possible events that occur in the individual silver halide crystals or emulsion "grains" to make them developable. The total picture image, of course, is the cumulative result of what the individual emulsion grains produce.

Latent image formation

Although our knowledge of latent image formation rests upon indirect evidence, certain facts have been rather well established. There seems to be little doubt today that the latent image is formed by a two-stage process. The first stage (often called the primary process) occurs as soon as an emulsion grain is struck by light. The second stage (secondary process) takes place less rapidly, although the completion of both stages requires but a very small fraction of a second. It is thought that reciprocity failure arises because of the two-stage mechanism of latent image formation.

Definition: the latent image

Now to account for reciprocity failure we must consider first what the latent image is, or at least what its properties are as far as promoting development are concerned. We know that emulsion grains that do not possess a latent image will not respond to developer action except after long periods of treatment. Therefore, the latent image is *something* that catalyzes the action of the developer so that adequately exposed emulsion grains form silver image particles in a fairly short period of time. An abundance of experimental evidence exists to indicate that this *something* is a small concentration of silver metal produced during the two-stage process referred to previously. It must be small indeed, because the electron microscope fails to show its presence. But as small as it is—possibly no more than five to ten atoms of silver metal—it does have a critical size for promoting developer action. For example, if we assume that a concentration of five atoms of silver are necessary to cause a grain to develop during a normal time period, then grains having one to four silver atoms concentrated on them at any particular point will not develop during this time period. Such grains are said to have a latent sub-image.

The inefficient atoms

Thus, we are dealing with a photochemical system in which the efficiency of utilizing light to form a very small number of *localized* silver atoms is all-important. Nothing is accomplished from a practical standpoint, for example, when an emulsion grain forms as many as 100 atoms of silver during exposure if these silver atoms are dispersed on the grain in groups of less than five atoms each. It is not unlike a writer who works like a beaver, but gets nothing accomplished in final form because he has spread himself too thin by accepting more assignments than he can possibly complete in the time available.

The silver halide grains of photographic emulsions, to function most efficiently, have to receive light energy at such rates that they can readily produce silver concentrations of a size capable of promoting development. When the emulsion grain absorbs light, electrons are released within the grain. These electrons carry a negative electrical charge and are capable of attracting silver ions within the grain which have a positive electrical charge. When the two get together an electrically neutral atom of silver is created. Now if enough meetings of electrons and silver ions occur at particular sites on the grain, the accumulation of silver atoms will become sufficient to catalyze developer action. But if a very large number of electrons are released in a short time period, as in an exposure of 1/5,000 second under a highly intense light, they will not be utilized efficiently in creating silver accumulations, but rather will tend to form numerous small concentrations. On the other hand, if a low intensity of *(Continued on page 53)*

SCIENTIFIC EXPLANATION

(continued from last page)

light is used, requiring a long time of exposure, some of the silver atoms that form at particular points on the grain might drift away to the other sites before the critical number of silver atoms has concentrated at any one site.

In other words, there is an optimum rate at which light energy can be used by emulsion grains to efficiently produce a latent image. The exact rate varies with the way the emulsion has been made, but in a general way it can be said that film emulsions are most efficient when exposed under light conditions such that exposure times of 1/10 to 1/1,000 second are required.

At high light intensities and short exposure times the loss of efficiency in establishing a useful latent image is called high intensity reciprocity failure. Under low light levels where long times of exposure are needed, we speak of low intensity reciprocity failure. A parallel of what occurs in these two instances can be drawn by considering a colony of ants which must build a hill three inches high before the ants can overcome a barrier preventing them from reaching a supply of honey. If we assume that the ants are endangered by fierce scavengers nearby we can consider what goes through the mind of the chief ant as he contemplates how the hill can be built most efficiently.

The chief might reason the situation in this way: If I allow all my colony to go to work at once they will become confused and begin to construct four or five hills, none of which will reach three inches in height before the honey evaporates. On the other hand, if I let my workers out slowly to assure that only one hill will be constructed, too many will be killed by scavengers, and my reserve will not last long enough to get the job done. Therefore, I had better release a fourth of the workers at a time so that not many will be caught alone and become lost to the scavengers. But yet the confusion will not be so great that they will try to construct more than 2 or 3 hills. At least one of the hills will reach 3 inches as the reserves replace the others.

Practical problems

Whether considering black-and-white or color materials, reciprocity failure leads to two major difficulties in photographic practice.

1. The effective speed of the film is lessened, sometimes by as much

(continued on page 56)

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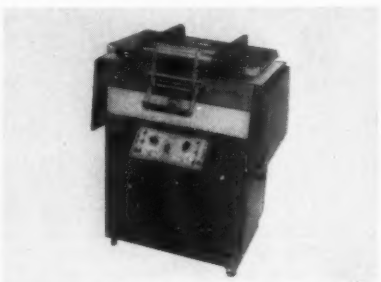
Get more information. Circle 407, page 59

NEW PRODUCTS

For additional information on any new products item, circle the appropriate number on the readers service card attached to page 59

Grover Multi-Printer 102

The Grover-Printer 12 x 20 contact printer has a built-in ColorTran Converter which makes it possible to control color temperature through a range of 2900 to 3400° K when doing color work. It can make exposures as short as 3 sec. on Metalphoto and can also be used for offset printing plates. The unit is also



equipped with a Time-O-Lite timer that automatically resets itself after each exposure. Lamp intensity can be regulated individually to control specific negative areas. Standing 35 in. high, the plywood contact printer has a Morse Pneumatic Platen that is said to be better and faster than a vacuum frame for holding printing material absolutely in position. Color separation filters are placed on a clear glass shelf that has additional area for glass filters. Price: $365.

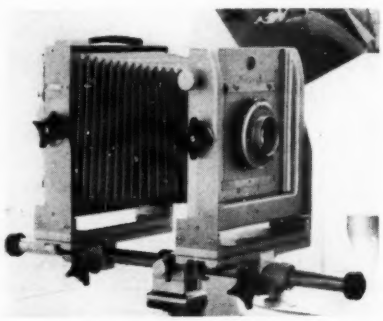
New Exposure Meter Can Be "Aimed" At Small Areas 106

The Elwood Foto-Meter Model Z-4, made by the Fotomatic Corporation, incorporates an optical viewing system which permits photographer to see exactly what portion of the scene he is reading. Looking through the viewer of the Foto-Meter you see the scene, a small black spot, a numbered dial and a needle. A photo-sensitive crystal measures only the light radiating from the area covered by the black spot. The needle gives a reading for the spot. Dials on the meter convert the reading to f/ stops and exposure times, to ft. Lamberts, LVS or EV numbers, to Polaroid numbers or to f/stops with 16, 32 or 64 fps for motion pictures. Accuracy over a ft.-Lambert range of 0.1 to 6,400 is claimed for the meter which, it is said, is not affected by background lighting.

The meter is powered by miniature batteries. It weighs approximately 12 ounces and is 7 in. long, 3 in. high. Price: $97.50.

Calumet 4 x 5 View Camera 109

An all-metal 4 x 5 mono-rail view camera offered by the Calumet Cor-



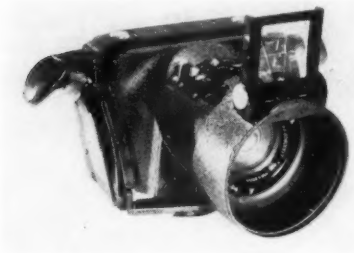
poration is equipped with horizontal and vertical swings centered on the lens axis, a rising and falling front and a rotating back. Large knobs and its lightness, the manufacturer claims, make the camera especially easy to handle.

Price: $150, f.o.b., Chicago.

Konica Aerial Camera 103

A new rapid-fire Konica Aerial camera is motorized to take as many as ten successive exposures on 120 film in 15 sec. A single click of the trigger button exposes the film, advances it, cocks the shutter and counts the exposure. Camera weighs 4 lbs., has pistol-grip handles and

an optical sportsfinder. It is equipped with an f/3.5 fixed focus 135mm Hexanon lens which stops down to f/22. Shutter speeds are



1/50, 1/100, 1/200 and 1/400 sec.

The camera will also be available with an 85mm fixed-focus f/3.5 Hexanon lens. Price: approx. $650.

Conversion for K-100 118

Par Products Corp. will convert Kodak K-100 roll film movie cameras to take a 400-ft. film magazine. The conversion requires very little modification of the camera, according to Par Products Corp., and does not interfere with normal use of 100-ft. daylight film loads in the regular film compartment of the camera.

Nems-Clark Electronic Timer for All Color Work 116

The Nems-Clark Type TC-100 Tri-Color Electronic timer for all three color processes (including Type C) is actually three timers in one housing. It has individual timers for red, blue or green correction filters used in Type C color printing. A single switch brings the desired timer into action. Each timer has four dials, three for time and one for automatic correction of the filter factor. Timers are in red, blue and green, indicating the filters for which they are designed. The Tri-Color timer operates on 115 volt AC, weight about 12 lbs., and measures 13 x 8½ x 5 in. Price: $840.

Primos Autofocus Enlarger 111

The new Primos 2¼ x 2¼ enlarger automatically focuses either of its two turret-mounted lenses. The enlarger is equipped with a 75mm Schneider Componar f/4.5 lens which magnifies 2¼ x 2¼ negatives from 1.4 to 8.5 times, and a 50mm Schneider Componar f/4.5 which magnifies 35mm negatives from 3.9 to 14 times. Larger magnifications are possible by focusing manually. Price: $289.50.

Fiberglas Duckboard 108

Less clatter of developing trays, easier cleaning, freedom from contamination and practically indestructibility are claimed for a new sink liner of plastic and fiberglas.

Grafic Fiberglas Duckboard resembles corrugated fiberglas panels used in building construction. It is sold cut to specification, in ⅜-in. thicknesses. Price per square foot: $2.35.

Camera Craft Type C Color Print Processor 112

The Model 35G processor offered by Camera Craft Inc. develops up to six 16 x 20-in. Type C prints in 3½ gal. processing solution tanks. The unit utilizes print-carrying baskets that are placed in chemical tank inserts surrounded by a master water jacket. An accessory compartmentalized convertible print basket accommodates either six each 11 x 14 or 8 x 10 prints. A Duplex Print Basket for up to twenty-four 8 x 10 prints is also available. Other features of the 35G processor are: integral gas system for solution agitation; placement of chemical tank inserts around a centrally located fast drain wash tank for efficient flow work; location of controls for wash tank and master jacket drain on the jacket top and jacket water level gauge.

For additional information on any new products item, circle the appropriate number on the readers service card attached to page 59

First Transistor Electronic Flash 105

A transistor replaces the conventional vibrator in the new Mecablitz 100 electronic flash unit, which has a guide number of 25 with Kodachrome. The transistor is one third the size of the vibrator it replaces. By increasing the frequency of the current it delivers by about 500 times, the transistor allows the use of a much smaller and lighter transformer than ordinarily required to give a 40-watt-second output, it is claimed.

The unit delivers 700 flashes from a set of six dry cells with a recycling time of 10 seconds, it is said.

Other statistics given by the distributor, Burleigh Brooks Inc., are: 70-degree angle of coverage, 5500 K output, and weight of four lbs. with batteries. Price: $49.50, without batteries.

New Automatic Processor 104

The Mini-Rapid 16—a portable daylight-loading self-feeding processor—for 16mm negative-type films—is the first such device to develop, fix and dry films at rates up to ten feet per minute, according to the manufacturer, Fairchild Camera and Instrument Corporation. Processing is of commercial quality, it is said, and the unit makes it possible to project as long a film as 100 feet in less than 20 minutes after shooting.

Dimensions of Mini-Rapid 16 are 27 x 12 x 13 inches—about the size of a file drawer. It weighs 70 pounds, operates on 110V AC, is made of welded stainless steel.

Unit is adjustable for degree of development. Film rinses in still water, but adaptations for running-water wash are available. Price: $1,250.

Fer-Color Projector 114

The 11-lb. Fer-Color 6-6 slide projector is designed for both 2 x 2 and 2¼ x 2¼ slides that may be projected on its built-in 12 x 12-in. screen or on a regular screen. The lid con-

taining the built-in screen drops out of the way for large screen projection. When closed, the projector resembles an attache case. The projector's optical system consists of a 100-watt lamp and multiple condenser system containing an aspherical element, and operates on 115-120-volt AC or DC. The Fer-Color projects a 3 x 3-ft. image at a projection distance of only 4 ft. A noiseless, electric turbo-respirator cools the projector. Price of the Fer-Color slide projector with Som Berthiot 57mm f/2.8 lens for 2 x 2 slides: $149.50. With Som Berthiot 85mm f/2.8 lens for 2¼ x 2¼ slides, price: $151.50. Price of the Fer-Color 6-6 with both lenses is $179.50. Price of an accessory film strip carrier is $12.

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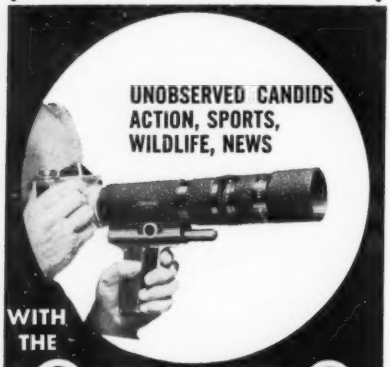

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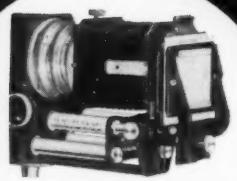

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RECIPROCITY FAILURE

(continued from page 51)

ful observation he can gradually develop the skill in handling these tools which constitute such a large step toward the goal of photographic excellence." (Italics mine.)

It is a general rule, nevertheless, that in black-and-white work the effects of high intensity reciprocity failure (short exposure times) can be largely overcome by prolonged development—anywhere from 20 to 100 percent increase over normal development, depending upon the particular film. However, low intensity reciprocity law failure may demand that the exposure be calculated on the basis of a much lower exposure index than normally used for the film.

Color materials like Anscochrome and Ektachrome exposed for very short times also require increased first development to correct for the flattening of highlight contrast and, in addition, color correction filters may be necessary to correct for the non-uniform speed changes of the three layers. However, the latter is a more serious problem under low intensities. But a lower-than-normal exposure index for calculating the exposure time is always necessary under low intensities of illumination.

THE END

SCIENTIFIC EXPLANATION

(continued from page 53)

as three or more lens stops.

2. The contrast or gradation is flattened.

Considering these two effects in terms of color films they both lead to a third difficulty, namely, incorrect color balance. The color balance is affected because the three emulsions of the color film do not fail equally to reciprocity effects, therefore, the color images cannot meet the requirements for gray-scale reproduction. LLOYD VARDEN

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Where to rent projectors, hire projection services or projection room facilities, get audio-visual devices repaired or buy A-V equipment and materials throughout the United States is the subject of a new directory, single copies of which are offered free by the National Audio-Visual Association, Inc., Box 337, Fairfax, Va.

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Get more information. Circle 458, page 59

ALCOA'S GREAT NEW MOVIE

(continued from page 40)

and even goes so far as to give the film strong visual impact at times when it might have gone flat. To determine this unusual exposure, Bagley claims, he often had to set apertures by instinct—"by the seat of my pants." There is a difference, he explains, of as much as six stops between the reading taken of a sheet of aluminum by a reflected-light meter and that taken by an incident-light meter.

Juggled Kelvins

"In most cases," he reports, "I used lighting and exposure for color effect. Juggling the Kelvin temperatures of my lighting, I could control the color in every area—from turning dark shadow areas into blues by underexposure, to adding or removing warmth of color by using lights of varying Kelvin ratings.

"Exact incident light readings were taken only when I wanted true color reproduction in skin areas."

The entire movie was shot with an old, reconditioned Bell & Howell 35mm camera equipped with 25mm, 35mm, 50mm and 75mm lenses on turrets. Film used was Eastman Color Negative Type 5248. A 16mm reduction Eastman Color negative master was made for 16mm color prints.

One of the high points of the movie, for the aluminum people, shows two rotating aluminum polyhedrons. Each has 18 faces, and each face has a different texture. Alcoa wanted to use this method to show all the possible textures available to designers who would use aluminum.

The cameraman was given the problem of lighting the polyhedrons so the texture of each face would show, yet keeping any possible reflections from hitting his lens. To accomplish this, he used four light sources. The blue background was flooded with regular 3200-degree Kelvin tungsten; one direct tungsten light was aimed slightly behind the polyhedrons for separation; overhead, a gauze-covered fluorescent light gave a faint blue cast to the metal; and the faces were lighted at a low, texture angle by the reflections from sheets of cardboard. The front was allowed to go black, accentuating the textures.

The finished movie gives the impression of having been a labor of love with an unlimited shooting

(continued on page 61)

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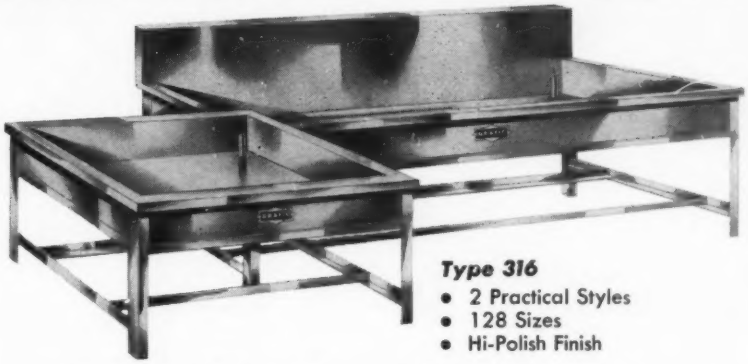

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FREE LITERATURE

AUDIO-VISUAL

16mm Sound Motion Picture Equipment **201**

Victor Animatograph Corp. 6-page illustrated folder describing Victor motion picture sound projectors, lenses, loud speakers.

Effective Presentation **202**

Eastman Kodak Co. New 20-page pamphlet on audio-visual film or slide presentation. Sections on how room facilities, seating plans, screen size and type and loud speaker location contribute to effective use of A-V equipment.

Arc Lamp Slide Projector **203**

Strong Electric Corp. Illustrated literature on high-intensity arc lamp projector which is powerful enough to illuminate 3¼ x 4 slides for 30-ft. wide screen and which also projects 2 x 2 slides.

Technical Presentations **204**

Technifax Corp. 16-page illustrated booklet on technical audio-visual presentation by John Bateson.

On Your Feet **205**

Polaroid Corp. The how-to of giving a good slide speech with Polaroid transparency slides. 12-page illustrated booklet.

Projection Screens **206**

Da-Lite Screen Co. Catalog of portable and electrically-operated screens.

Rear Screen Projection **207**

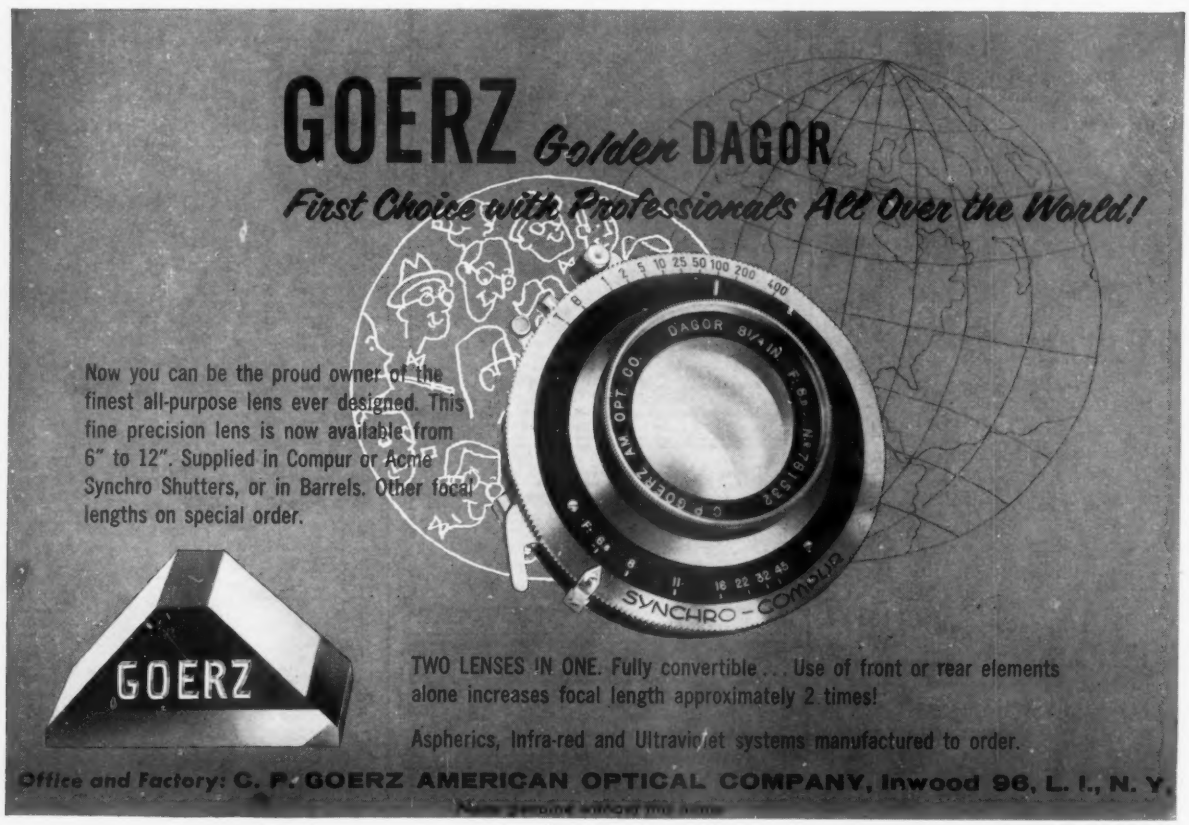
TelePrompter Corp. 6-page folder describing the use of the TelePro 6000, rear screen projector with a rapid slide change of up to 62 slides per minute.

Slide Binders **208**

Erie Scientific Corp. Price list on fibreboard and glass type-on mounts and aluminum mounts for 2 x 2 and 2¼ x 2¼ slides.

Overhead Projector Presentations **209**

Ampto, Inc. "How to Make Colorful and Dramatic Presentations" is the title of an illustrated 12-page brochure on overhead projector presentations. Described are the problem of presentation, making the transparency, copying from printed texts and preparing charts in color.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Karl Heitz, Inc. Fully illustrated 34-page booklet describing the 35mm Alpa-Reflex camera, camera lenses, accessories, special copywork, close-up photography, special uses. Filter and lens charts.

Canon Camera **211**

Canon Camera Co. Price list for this 35mm camera and lenses for a complete photographic system.

Optics **212**

Elgeet Optical Co., Inc. How an optical company can design and develop lenses and optics for the industrial consumer.

Tanack Camera and Tanar Lens **213**

Kine Camera Co., Inc. Literature on the Tanack 35mm camera and interchangeable lenses made by the Tanaka Optical Co.

View Camera **214**

L. F. Deardorff & Sons, Inc. Price list and descriptive material on 4 x 5, 5 x 7 and 8 x 10 View Cameras and accessories.

Decamired Filters **215**

Enteco Industries. Folder tells how to use Decamired light-balancing filters. Complete with charts, tables and prices.

Close-up Accessories **216**

Photographic Importing and Distributing Corp. Folder describes Bellowscopes and Bellowsmats, extension tubes, microscope adapters and other close-up aids for 35mm cameras such as the Exakta, Praktica, Leica and Argus. Illustrated, with prices.

EQUIPMENT

Negative Files **217**

The Nega-File Co. 20-page catalog describes files for microfilm, film strips, motion picture film, mounted transparencies, lantern slides, prints and negatives. Illustrated, complete with dimensions and prices.

Industrial Photo Dryers **218**

Simplex Specialty Co. Folder gives descriptions and specifications for gas or electric, plate and drum photographic print dryers. Illustrated. Included are Peerless Jr. and Senior, Simplex Ideal, Simplex Double Drum, Simplex Plate Glossy, Simplex Hi-Gloss and Simplex Supergloss dryers.

Cold Lamps **219**

Aristo Grid Lamp Products, Inc. Catalog sheet on professional cold light enlarger heads.

Processing Equipment

Leedal, Inc. Illustrat catalog. Information o layout, selecting film equipment, print washer accessories.

Temperature Control Valves

Jordan Corp. 6-page fol perature control mixing darkroom plumbing.

SUPPLIES

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Papers **229**
, Inc. Bulletin describing
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se.

Camera **230**
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price of process camera.

LIGHTING

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trial photography.

Electronic Flash **232**
Lightning-Lite Products. 20-page catalog and price list of portable and studio-type electronic flash units.

Ascor Speedlights **233**
American Speedlight Corp. 6-page folder and price list of Ascor Series 500 Speedlights.

MOTION PICTURES

16mm Editing Equipment **234**
Victor Animatograph Corp. Editing viewers, film splicers and rewinds described.

Cine Titler **235**
S.O.S. Cinema Supply Corp. Four pages of data on the S.O.S. titler and special effects kit.

Film Reconditioning **236**
Peerless Film Processing Corp. 8-page pamphlet describing the cleaning, scratch-removal, repair and rehumidification treatment of motion picture films.

Instrumentation Camera **237**
Traid Corp. Illustrated pamphlet with technical data and operating characteristics of Traid TN-9 instrumentation camera. Price list.

Professional Equipment **238**
Producers Sales Co. Catalog of Acme Equipment cameras, animation equipment, title stand, optical printer, photo-sonic equipment.

Cine Catalog **239**
Camera Equipment Corp. Complete catalog of motion picture cameras, equipment and accessories with rental prices.

Film Cleaner **240**
Electro-Chemical Products Corp. Folder describes Ecco #1500 film cleaner and its application.

Reversal Processing **241**
Lab TV. 4-page folder gives exposure indexes for 16mm reversal film and prices for processing.

Time-Lapse Cine Equipment **242**
Rolab Photo-Science Laboratories. 16-page booklet describes time-lapse cine equipment, single frame camera drives, microcinema apparatus, synchronomous timers and footage indicators.

Film Repair **243**
Rapid Film Technique, Inc. "The Film Doctors" folder tells of Rapidweld treatment to remove scratches and rejuvenate old film and of Rapidtreat lacquer which hardens and protects new film.

Cine Lights **244**
Sun Ray, Inc. Brochure describes flood lights, spot lights and lighting stands for industrial motion picture taking.

SERVICES

Catalog **245**
Admaster Prints, Inc. Catalog of photographic services from color stats to slide films.

Color Slide Duplicates **246**
Hamilton Color. Price list gives prices for duplicating stereo, 35mm and other color transparencies up to 35mm, singly or in quantities of 700 or more.

ALCOA'S GREAT NEW MOVIE

(continued from page 57)

schedule. Actually it was shot in just 15 weeks, because Alcoa, after six months' preparation, was in a hurry.

"We worked at a terrific pace, and a major reason that the film was done on time, and so well received is that I had an excellent crew," Bagley said.

Shot at a low, eight-to-one footage ratio—the film was obviously the result of careful planning and expert execution from beginning to end.

The film itself is titleless, as mentioned previously. It goes by at least two names—*Man On a Skyhook* and a more prosaic, *Textures and Finishes in Aluminum*. By any name, it's a rose. And credit is due its creators: writer, designer and co-director Tracy Ward; co-director Wheaton Gallentine; composer Frank Lowen; narrator Walter Abel; and Ralph L. Hoy of Alcoa.

A viewing is sure to inspire photographers and give valuable ideas to management men who deal with visual materials.

Distribution is handled by the motion picture section of Alcoa in Pittsburgh and by Associated Films, New York. THE END

METHODS FOR TOMORROW

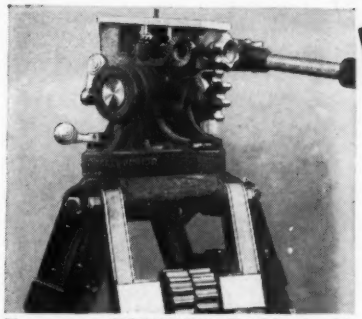
(continued from page 14)

though a silver halide emulsion is used for the negative stage in making a Verifax copy.

The diffusion transfer copying system also requires a silver halide emulsion, but the method of forming the final copy image does not follow the normal photographic procedure. So here we have one non-silver method and two atypical silver methods all filling a particular need. Together they have expanded the office copying field without replacing normal photographic systems in other fields.

Now electrostatic processes, such as xerography and Electrofax, stand a good chance of actually replacing silver materials in some areas of application. Anyone who saw the demonstration of the Haloid Copyflo Continuous Printer at the Visual Communications Conference was bound to be convinced that for making enlargements from entire microfilm reels nothing available among present silver processes could begin to compete with it.

The Reprofax printer of the Reproduction Products Company is also based on an electrostatic procedure, and it is rumored that several other electrostatic copy machines will soon be introduced. THE END



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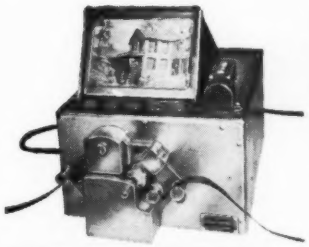

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by Edward R. Farber

ELECTRONIC FLASH

Electronic flash is much too often regarded only as a substitute for flash bulbs to the neglect of its numerous other characteristics.

True, it does a quick and economical job where large numbers of exposures are required. But its flash is far less distracting. Negatives are generally softer and there is less tendency to "block up." Its color is reasonably compatible with daylight. It's a "cool" source minimizing heat absorption by the subject. Its power requirements are low and heavy wiring is usually unnecessary. It eliminates time-consuming and expensive delays occasioned by the changing of flash bulbs in multiple-flash shots.

In some cases the bulk and weight of equipment will overcome the advantages, particularly if great quantities of light are needed. And some have claimed that the light does not carry as far as conventional sources. There seems to be no basis in fact for the belief. All the laws of light apply. As one wag put it, "the problem is not the carrying power of the light, but the carrying power of the photographer." But even so, the industrial applications of electronic flash are limited only by the imagination and the pocketbook.

Time magnification in millions

So, rather than thinking of electronic flash as another light source, the industrial photographer might do well to regard it as a time microscope . . . a device to magnify time, to record the result on film.

It often enables us to see the unseen without the aid of a high-speed motion picture. Sometimes it will do it better, and the result is easier to duplicate, to measure, and otherwise evaluate.

Since flash durations can range from 1/300 to 1/1,000,000 of a second or so, our "electronic shutter" can enable us to see much that escapes our ineffectual eye.

All of us are familiar with the classic shot of the golf ball being flattened by the club head, unseen and probably unsuspected till photographed by Edgerton and his early speedlight almost 20 years ago. Similar shots of automobile tires traveling at high speed disclosed heat generating standing waves in the tires. Elimination of these standing waves has given a tire which will not fail under sustained travel over 100 mph.

Photos of the action of shuttles in looms, ink transfer in high-speed presses, crankshaft whip, and the orientation of fibres in papermaking have all resulted in improved machine design.

Electronic flash shots have not only solved baffling engineering problems, but have dramatized the solution to customers and management alike. At the Goodrich Rubber Co., Bob Coon got some heavy sheets of safety glass, placed them over a grease pit opening, and wet them down. Then he used a couple of small 200-watt-second units to show the wiping action of the skidding tires. He triggered the shutter as the car was braked over the glass plates with the camera aimed up from the pit. This would seem like an almost elementary idea, yet for the first time, conjecture was turned into conviction. The squeegee action could be seen and analyzed. The equipment and execution were neither expensive nor involved.

There is always the problem of the "exact instant" though, and here is where our "shutter" shines. It's easy to synchronize it to the event with mechanical or electrical impulses or photoelectric or radio control.

Such synchronizing devices can be very crude. A bent wire can make contact with a rotating part on a machine. The camera shutter is opened for one flash or more. The image can be displaced on the film for a sequence of shots, by moving the camera if the object is still.

Two layers of metal foil separated by a thin layer of insulating material will trigger a unit when the fragile foils are momentarily connected by being punctured by flying fragments.

Microphones are used to pick up

(continued on next page)

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ELECTRONIC FLASH

(continued from last page)

the sound of a gun shot, explosion, or thud of a falling object. The sound can be amplified with standard hi-fi equipment and the pulse applied to the trigger tube of the flash unit. The electronics are not involved, but will vary with the make of unit.

Sound triggering makes it easy to delay the flash the required amount. Moving the microphone farther away delays the flash by a duration equal to the time sound takes to travel the extra distance.

A series of shots was made showing the way in which plate glass fractures when struck by a bullet. The "mike" was moved a few feet farther after each exposure.

Photo tubes can solve some vexing sync problems. Close-up shots of bats in flight were required. They flew only in the dark. The cage had to be large. Two pencil-like beams of light were caused to intersect in the middle of the cage. Each one impinged on a phototube. The camera shutter was left open. When the beams were interrupted simultaneously, the light flashed. Thus, the camera could be focused on a very limited area and long lenses used to fill up the negative. Every shot was in focus!

Multiple image still photography can dramatize movement. The running child, the arm swinging the hammer, the falling object, have all been widely used in advertising, but remember too that timed successive flashes at known intervals can be used to measure velocities. The multiple flash shot of the golf swing is a good example of a simple way to record a changing speed. Such shots can also plot the path of objects.

At least one manufacturer (American Speedlight Corp.) builds special equipment for photomicrography and macrophotography which can be set for single flashes of great intensity or for "continuous" light.

The latter is accomplished by an accessory device which permits low power flashes at rates ranging from two to 120 flashes per second.

Specimens are not damaged or destroyed by prolonged exposure to intense heat, yet hitherto unsuspected characteristics are readily recorded in black and white or color.

The less dramatic uses of measured amounts of cool light are increasing too. Copying, enlarging, printing, and even the replacement of arcs in the engraving field will soon be commonplace, but the industrial man can best expand visual horizons with electronic flash. THE END

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GRAPHIC ARTS

(continued from page 20)

of three duplicating materials on the second drum. *Timefax* recording paper makes single, dry copies of the original. *Stenafax*, a vinyl film coated on a backing sheet, produces mimeograph stencils. *Planafax* sheets, similar to paper offset plates, produce litho plates for small duplicators. Originals in line, type, halftone and continuous tone can be reproduced in each of the three applications—though the tone scale is somewhat abbreviated. A recording head reproduces the original by means of an electric spark of varying intensity. Reproduction is the same size as the opaque original; maximum copy size is 8½ x 14 in. Little skill is required to operate the machine.

SCAN-A-GRAVER & SCAN-A-SIZER
Fairchild Graphic Equipment, Inc.

The *Scan-A-Graver* is also a lathe-type scanner: copy is wrapped around one drum, the reproduction material around another. A small light is focused on the original, which may be a photograph or a drawing. On the reproduction side of the machine, a vibrating, hot stylus with a pyramidal point burns into a plastic sheet to a depth which varies with the brightness of a corresponding spot on the original. Screen rulings from 65 to 120 lines are available.

Reproduction is limited to same size halftones; maximum copy size is 8 x 10 in. The plastic engravings may be mounted for direct printing, or may be stereotyped.

Similar to the Scan-A-Graver is Fairchild's *Scan-A-Sizer*. This variation enlarges or reduces the original copy in a range from 22 to 450 per cent. The scanning section is flat, the reproduction section is cylindrical. Maximum plate size is 13 x 16½ in. The machine produces any two of a number of "screens" in rulings from 65 to 120 lines per inch.

KLISCHOGRAPHS

Rudolph Hell Co., Germany, imported by Consolidated International Equipment and Supply Co.

The *Screen Klischograph, Model K 150,* is an oscillating, flatbed scanner. The engraving is accomplished by a diamond-shaped stylus which literally chisels a dot image into a plastic, zinc, copper, aluminum or magnesium plate. Opaque copy only; 60 to 120 "screen" same-size engraving; maximum plate size of 6 x 8 in. About 1,000 of these machines are in use in the world, 150 in the United States.

The *Color Klischograph, Model F 160,* is similar to the Screen Klischograph. It differs in that the scanning head is modified to include color filters and a beam splitter to divide the beam into separation and color correction signals. The result is four color plates in three hours' time from opaque color copy. Reproduction ratio is 1:1; maximum size of plates is 6 x 8 inches.

SPRINGDALE COLOR SCANNER
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Although not for sale or lease, this device, also known as the *Time-Life* scanner, produces continuous-tone color separation negatives from color transparencies for any of the standard reproduction methods. You submit your transparency to PDI service centers in New York, Chicago or San Francisco. A lathe-type scanner, it has five drums rotating on a common axis. A transparency up to 8 x 10 in. is mounted on the glass drum through which a pinpoint beam of light shines. This beam is split into the primary colors after it has passed through the transparency. The electronic circuits compress the contrast of each of the three beams, calculate color corrections, devise a black printer signal, compute under-color removal and finally activate lights to expose the yellow, magenta, cyan and black negatives. The negatives are continuous-tone films; the scanning lines are either 500 or 1000 to the inch. Reproduction is at same size. Many *Life* magazine color plates are made with the aid of this device.

A Swiss firm, Elgrama Co., makes a scanner for engravings with an irregular dot pattern. One such machine is undergoing shop tests in the United States.

Subscribers to the National Editorial Association have available a scanner which produces color-separation negatives from transparencies and opaque copy.

The Radio Corporation of America and R. R. Donnelly & Sons Co. are testing and developing an all-electronic scanner for separation negatives.

Meanwhile, Fairchild and Hell are reported working on variations of their current models.

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INDUSTRIAL COLOR

(continued from page 11)

ance for all negatives. It doesn't work in practice. We find that the balance varies from emulsion batch to emulsion batch; that negative processing, even with extremely careful controls, further alters the balance of the negative. Thus the darkroom operator must change his filter pack for each one anyway.

As these variations do exist and do not hamper the quality of the prints the color labs produce, we feel that the logical place for color control is in the enlarger.

The main taboo is against mixing light from sources of different color temperature. Here the same rules apply as with reversal materials; for example, use blue bulbs for flash fill-in outdoors.

Fluorescents? Maybe

The manufacturer does not recommend fluorescent lighting with any color material. Some tubes do not emit light from the entire spectrum. It is not practical to try to correct this illumination on the spot. To do so would require a rainbow of filters and days of testing. But with negative materials, filtration in the enlarger usually can overcome the color distortion fluorescent lights produce. We've processed Kodak shots made by fluorescent light which were fully acceptable.

The super-deluxe white fluorescent tubes have the best color characteristics for photography.

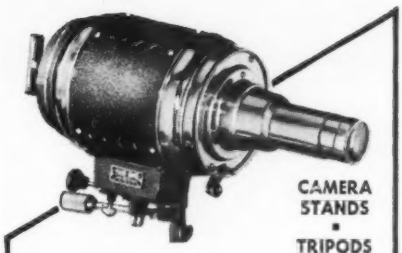
Next month: Type C prints and how to get the most out of them; black-and-white prints from color negatives; Dye Transfer prints; negative-positive film in graphic arts.

NEW COLOR FILM FOR MISSILE TRACKING

A new high speed, high contrast color film for missile tracking has been developed by the Eastman Kodak Co.

The new film, known as SO-1218, is a fast negative color film. An exposure index of 200 is recommended, but under some conditions it may be used at an arbitrary exposure index of 800. The high contrast of the film makes target objects more easily visible against a blue or gray sky, it is said.

In some missile tracking and other types of specialized uses, the color negative may be examined directly. The film can be developed in the solutions used for Kodacolor film.



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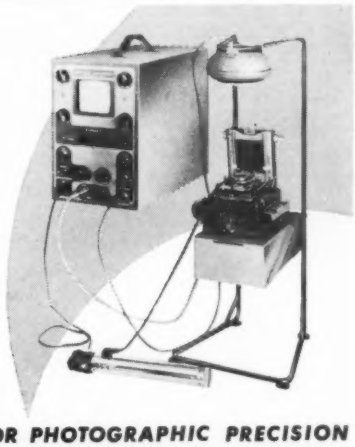

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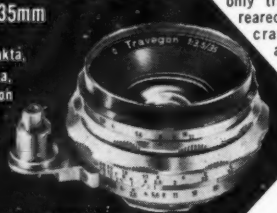

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TWILIGHT TO DAWN

(continued from page 27)

photographer sets up other cameras, varying his exposure on each camera. Using a film with an exposure index of 80 to 125 and an aperture of f/11, I usually give the sky an exposure of 1/50 sec. on the first camera, 1/25 sec. on the second camera, and 1/10 sec. on the third camera. When it is dark, I make a second exposure for the lights and the structures, using 1 sec. on the first camera, 5 secs. on the second and 10 secs. on the third. The photographer should keep accurate records of the exposures made on each camera. After developing he may find that the ideal is his shortest exposure of the sky and his longest exposure of the buildings. With accurate records he knows exactly what to do when he re-shoots the picture.

An industrial night picture shot after sundown may be a meaningless collection of isolated lights unless some activity is illuminated. Actual motion, of course, will not show up in a long exposure. Flash or electronic flash illumination solves this problem. While the photographer is exposing the film he can signal to his assistant to light the activity with a flashgun. The assistant himself should be hidden behind a post or building—or stay out of camera range. Care should be taken that direct light from the flash does not fall on the lens. Flash exposure can be balanced by regulating the distance of the flash from the subject. Open flash, by the way, allows the flash bulb to give more light then synchronized flash at speeds from 1/50 sec. up. This additional light is helpful with the long distances and nonreflective surroundings often encountered in night photography.

Naturally, more than one bulb or electronic flash can be used if an especially large area must be lighted. More than one location can be illuminated by the assistant going from one place to another while the photographer covers his lens between flashes. A number of assistants flashing simultaneously gives the same effect.

This system can be used just as effectively when there is no special activity going on. On an assignment to photograph a lighthouse, for example, I waited for a foggy night and set off three No. 22 G. E. flash bulbs from the back of the lighthouse to rim the edges of the structure with light.

To get special effects, you can use colored filters in front of the flash bulbs in different spots. Another interesting color effect can be achieved by using both clear and blue bulbs in the same exposure.

Having the plant electrician replace the regular bulbs in the structure with No. 1 photofloods can be a big help in lighting "dead" areas.

Contrary to popular belief, halation and flare are not problems with modern coated lenses and films unless a light is too close to the camera. I always take along Scotch tape (the photographer's lifesaver) and a cardboard "gobo" to shade the lens from stray light when necessary.

But I prefer not carrying such corrections too far. Sometimes halation is exciting, especially in a rain or fog shot. Steam in industrial plants, too, can be utilized pictorially and emphasized by backlighting. The reflection of lights on ground just wetted by rain can make an unusual picture out of an ordinary one.

Inside shots at night look like inside shots anytime unless the photographer makes it clear they're taken at night. I find the burning-of-the-midnight-oil mood is best illustrated by photographing through a window framed by the darkness. Inside illumination can be available light, flood, flash bulbs or electronic flash. I calculate my exposure just as if I were making the picture inside. The through-the-window technique establishes that the picture is a night shot. By suggesting that this is an intimate glimpse of the work being done inside, you satisfy a natural, human curiosity.

Any camera from a Brownie box to the 8 x 10 Deardorff can be used successfully to take night shots. Personally I prefer view cameras which have swings, tilts and shifts to increase depth of field and straighten converging lines. I can compose my pictures more conveniently with a ground glass. For long and multiple exposures, I like to leave my lens open on "time" and use the lens cap as a shutter. This minimizes camera movement. Some of the "hand" cameras prevent perspective control and make multiple exposure difficult, but fine night photography depends more on the photographer than the camera. Further, small cameras have advantages of their own, notably fast lenses and increased depth of field. There is no reason why a color shot on Ektachrome must be exposed 1 sec. at f/8 when just as correct an exposure can be obtained on a miniature camera for 1/25 sec. at f/1.5.

As I said, I prefer a medium speed film (Super Panchro-Press Type B, or Verichrome Pan for roll-film cam-

eras) but very successful night photographs have been taken with high speed films or slow, contrast films.

As for developing, I generally use the manufacturer's formulas and increase developing time by about 20 per cent to increase contrast—although most of the control can be done in the printing by choice of paper and dodging in enlargements.

I repeat, the essence of creative photography is to challenge the old rules for unusual, more satisfying photographs. THE END

SUPER SLIDES

(continued from page 41)

mask as a cropping frame and move it about the transparency until you pick the exact composition you wish. Thus you can correct slight compositional or cropping errors while you mount your transparency.

This versatility of the super slide extends to other corrections as well. For example, one industrial photographer makes all his product illustration transparencies on a 4 x 5 view camera with a 120 roll film back. With the swings and tilts of the view camera, he is able to make sure all his vertical lines are vertical when shooting up or down and to extend his depth of field so that the entire subject is sharp. A mask attached to the ground glass of the view camera tells him just what he'll get in his final slide. The slides themselves are convenient for his firm's salesmen to use.

How to use them

A number of products on the market are designed for the use or simplification of the super slide system.

You can use or adapt most any Rollei to the 38mm-square size so your slides come already mounted from the finisher.

The "baby" Rolleiflex 4 x 4 shoots 12 Super Slide frames on a 127 roll. Both the standard Rolleiflex and the Rolleicord can be converted for Super Slide use with an Original Super Slide Kit ($3.95). The kit consists of a viewing mask for the ground glass, a mask for the film and a supply of cardboard mounts. Specify the model of your Rolleiflex or a Rolleicord when ordering the kit; the film plane mask for each is different. The film plane mask, which is substantially different for each model, seldom works with anything but the Rollei. A special counting device permits you to squeeze four extra Super Slides on a roll of 120 film in the Rolleicord Va.

The HPI Master Kit for Super Size Slides ($3.95) is designed for other 2¼ x 2¼ reflexes, either the single- or twin-lens variety. A plastic mask fits the ground glass to show you the limits of your 38 x 38mm frame. After processing, you use the metal template supplied with the kit to outline the slide area. You score the film with a stylus, also supplied. Then you cut the transparency along the scoring and heat seal the trimmed film in a cardboard mount.

Hasselblad owners can get a 16 Roll Film Magazine which permits 16 super slides to be made on a 120 film. The actual size of the pictures turned out with the new back is 60 x 45mm. You can use the HPI mask for framing and the HPI template to mark transparencies for super slides. Hasselblad also supplies a framing mask for $1.30.

Among the simplest cardboard mounts to use are the Armme Kwik Mount and the Craftsmen's Guild Super Easymount. You slide the film into either, with no adhesive sealing.

The Porter Cropto-Slide mount is similar to the heat-sealing mounts supplied for the HPI and Rollei kits but it has an adhesive that requires only moistening with a solution provided with the mounts and pressure —no heat. Further, the film is inserted and sealed before you trim it.

Burleigh Brooks and HPI offer the heat-sealing mounts packed separately.

For permanency, you'll probably want glass protection for your super slides. If you're accustomed to binding glass with tape, you might want to use special 38 x 38mm paper masks made by Porter or by Gemounts. You sandwich your super slide and the mask between regular 2 x 2 cover glass.

However, the Emde and the 2 x 2 Super-Slide Glass Mount for Rollei, which slide neatly together, are simple to use and expose more of the Super-Slide than regular glassless cardboard binders. The Esco glass mount provides for insertion of the transparency before trimming and has a spacer for cushioning the cover glasses from each other.

The Titania plastic Super Slides have glass inserts for super slide protection.

Another version of the Emde glass and aluminum mount holds super slides already mounted in cardboard and eliminates remounting.

All of them give you the super slide, perhaps the ideal slide format. THE END

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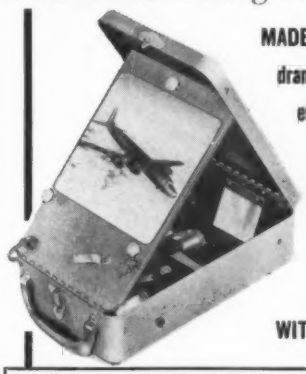

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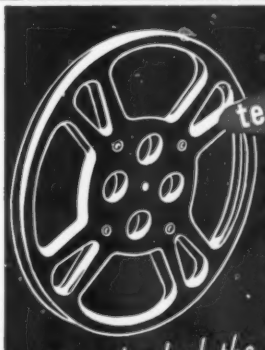

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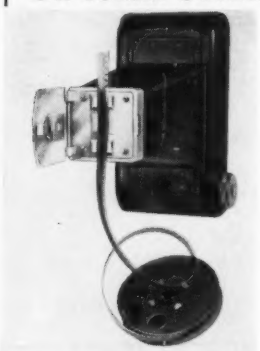

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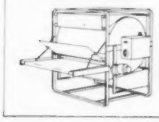

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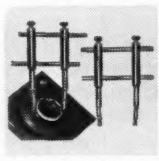

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ADVERTISERS' INDEX

JANUARY 1958

AGOF SCHACHT LENS CORP. 66
AIREQUIPT MFG. CO., INC. 17
AMERICAN SPEEDLIGHT CORP. 22
AMPHOTO 13, 63, 65
ANCHOR CHEMICAL CO. 68
ANSCO DIVISION (GENERAL ANILINE & FILM CORP.)..... 15
ARISTO GRID LAMP PRODUCTS, INC..... 63
ARKAY CORP. 54

BERNDT-BACH, INC., AURICON DIV. 20
BURKE & JAMES, INC. 64

CALUMET MFG. CO. 11
CAMERA CRAFT 18
CAMERA EQUIPMENT CO. 61
CAMERA OPTICS MFG. CORP. 67
CARGILLE SCIENTIFIC, INC. 57
CLAYTON CHEMICAL CO. 8, 61
COLIND PHOTOGRAPHY 65
COLOR CORP. OF AMERICA 63
COMPCO CORP. 56

DAVIS & SANFORD CO., INC. 18

EASTMAN KODAK CO. .. 21, Fourth Cover
EDWAL SCIENTIFIC PRODUCTS CORP..... 53

GENERAL FILM LABORATORY, INC 63
GERMAIN PHOTO SPECIALTIES, INC..... 57
GEVAERT CO. OF AMERICA, INC. 7
GOERZ, C. P., AMERICAN OPTICAL CO... 58
GOLDBERG BROS. 67
GRAFIC STAINLESS STEEL PRODUCTS, INC. 57
GRAFLEX, INC. 19

HAMILTON COLOR 68
HARWALD CO., INC., THE 68
HEITZ, KARL, INC. 14

IDEAX CORP. 62

JOHNKE MFG. CO. 68

KALIMAR, INC. 5
KIN-O-LUX, INC. 64
KLING PHOTO CORP. ..... Third Cover
KURSHAN & LANG COLOR SERVICE, INC. 66

LAB TV 53
LECO PHOTO SERVICE, INC. 6
LEEDAL, INC. 12

MAYER, KURT, COLOR LABS 65
METEOR PHOTO COMPANY 10
MICRO RECORD CORP. 63

NATIONAL CAMERA REPAIR SCHOOL ... 65
NEMS-CLARKE, INC. 53
NIKON, INC. ..... Second Cover

PLYMOUTH PRODUCTS CO., INC. 16
POLAROID CORP. 3

RAVEN SCREEN CORP. 63
READERS SERVICE 59, 60

SEARY-MICHELBACH CORP. 56
SETHCO MFG. CO. 57
SIMPLEX SPECIALTY CO. 6
S.O.S. CINEMA SUPPLY CORP. 6
STANDARD CAMERA CORP. 9
STILL-MAN EQUIPMENT CORP. 68
SUN RAY PHOTO CO., INC. 65

TESTRITE INSTRUMENT CO., INC. 68
THORO PRODUCTS CO. 68

VACUUMATE CORP. 53
VALENTINO, T. J. 65
VAN CAMP COLOR CORP. 57
VOSS PHOTO CORP. 56

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